

Dakhleh Oasis Project Monograph 18

PREHISTORIC POTTERY FROM DAKHLEH OASIS, EGYPT



ASHTEN R. WARFE

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Front cover: Reconstructed upper vessel from Locality 135, Dakhleh Oasis

Contents

<i>Preface and acknowledgements</i>	vii
<i>List of plates</i>	ix
1. Introduction	1
1.1 Methodology and structure of study	2
1.2 Research history on the pottery collection	4
1.3 Points of clarification	5
PART I	
2. Technology, terminology and description	9
2.1 Methods of analysis	9
2.2 Fabric description	9
2.2.1 Groundmass	9
2.2.2 Inclusions	10
2.2.3 Technological properties	12
2.3 Surface treatment description	12
2.3.1 Plain	12
2.3.2 Coated	13
2.3.3 Compacted	13
2.3.4 Textured	13
2.3.5 Decorated	13
2.4 Shape description	15
2.4.1 Vessel shape	15
2.4.2 Vessel contour	15
2.4.3 Proportion	15
2.4.4 Miscellaneous objects	15
3. Classification	18
3.1 Fabric classification	18
3.1.1 Fabric Family 1: sand-and-shale	18
3.1.2 Fabric Family 2: shale-rich	19
3.1.3 Fabric Family 3: sand	20
3.1.4 Fabric Family 4: vegetal	21
3.1.5 Fabric Family 5: fine sand and limestone	22
3.1.6 Fabric Family 6: gypsum	23
3.1.7 Fabric Family 7: clay aggregates	23
3.1.8 Fabric Family 8: marls	24
3.1.9 Fabric Family 9: densely textured	24
3.2 Ware classification	24
3.2.1 Plain (Hp) wares	25
3.2.2 Compacted (Hm) wares	26

3.2.3 Coated (Hc) wares	26
3.2.4 Textured (Hx) wares	26
3.2.5 Decorated (Hd) wares	26
3.2.6 Compacted-and-coated (Hmc) wares	26
3.2.7 Compacted-and-textured (Hmx) wares	26
3.2.8 Compacted-and-decorated (Hmd) wares	26
3.2.9 Textured-and-decorated (Hxd) wares	26
4. Quantitative analysis	27
4.1 Methods of analysis	27
4.2 Analysis using multidimensional scaling and similarity percentage	28
4.3 Accounting for pottery from Masara sites	34
4.4 Characterising the Bashendi pottery tradition	36
4.4.1 Bashendi A	36
4.4.2 Bashendi B	38
4.5 Accounting for the pottery from sites 401, 407, 409, 420, 422 and 423	41
4.6 Characterising the Sheikh Muftah pottery tradition	42
4.6.1 Early Sheikh Muftah	43
4.6.2 Late Sheikh Muftah	45
4.7 Handmade pottery from sites that are not registered on the Holocene prehistory index	50
4.8 Handmade pottery from findspots	50
5. Long-term change in the ceramic record	52
5.1 Summary of fabrics	52
5.2 Summary of surface treatments	54
5.3 Summary of vessel forms: shape and size	55
5.4 Comments on ware and shape cross-tabulation	57
PART II	
6. Provenance	61
6.1 Distinguishing locally made and imported pottery	61
6.2 Thin-section analysis (<i>by Mark Eccleston</i>)	66
7. Conclusions	74
7.1 Pottery variation and classification: reaching a compromise	74
7.2 Towards a better understanding of the early and mid-Holocene cultural units	75
7.3 Future directions for study	77
<i>Appendix: Site collections</i>	79
<i>Bibliography</i>	88
<i>Plates</i>	95

Preface and acknowledgements

Pottery forms an essential body of evidence to study human development in Egypt's Western Desert during the early and mid-Holocene period. It is through this artefact that we may access the social relations and adaptive patterns of the desert and oasis inhabitants. As a material category prone to temporal change, pottery also forms a valuable dating tool and, more broadly, a device for characterising the desert groups and their movements across the region.

This monograph stems from my doctoral dissertation submitted for examination to Monash University, Australia, in 2008, the subject of which was a study of pottery remains from early and mid-Holocene sites in Dakhleh Oasis. Presented here are revised versions of three chapters along with new content that offer a systematic description, classification and quantification of the early Dakhleh pottery collection. Such an exercise forms a necessary foundation for research that seeks to interrogate the social and economic lifeways of the early oasis inhabitants. A section on provenance is also included to situate the study within the broader context of archaeological research in northeast Africa, and to offer colleagues working on ceramic material from the desert regions and Nile Valley some points for contrast and comparison.

As with all major research projects there are acknowledgements to be made. First and foremost I wish to thank A/Prof. Colin Hope. It was at his invitation that I came to study the collection of pottery from Holocene sites in Dakhleh, and it was through his guidance that I learned the intricacies of ceramic analysis and archaeological inquiry more generally. I am deeply grateful for the trust placed in my capabilities and for the supervisory support. My thanks also to Dr Gillian Bowen for her generosity in knowledge and her guidance in areas of academic writing. Without such, my work would be much poorer in its presentation. Special thanks are reserved for A/Prof. Mary

McDonald, whose dedication to the study of Egyptian prehistory has served as a constant inspiration and guiding light, and whose field experience has taught me much about ways to read the ancient landscape.

As the research for this study was conducted mostly in the field, my thanks extend also to the Dakhleh Oasis Project, particularly to Professor Anthony Mills, whose rich knowledge of the Western Desert and expertise as field director enabled me to conduct research in a productive and highly engaging research environment. For field assistance in exploring aspects of ceramic technology I thank Michelle Berry, Dr Andrew Jamieson, Dr Paul Kucera and John O'Carroll. And for the many enriching conversations on matters of archaeological, scientific and environmental inquiry, I am deeply grateful to Professor Charles Churcher, Dr Mark Eccleston, Professor Olaf Kaper, Professor Emerita Maxine Kleindienst, Professor Jennifer Smith and Dr Ursula Thanheiser.

I thank my thesis examiners Professors Hans-Åke Nordström and Kenneth Sassaman for their careful suggestions on ways of developing my doctoral research, and for their generosity in providing information on early Egyptian pottery I extend my sincere thanks to Dr Renee Friedman, Dr Maria Carmela Gatto, Dr Stan Hendrickx, Dr Karin Kindermann, Professor Rudolph Kuper, and especially Dr Heiko Riemer for the thought-provoking discussions on desert pottery, social practices and adaptations.

Finally, for stimulating discussions on Egyptian archaeology and material culture studies I thank the current and past postgraduate students in the Centre for Ancient Cultures at Monash University. This publication was prepared while holding a lecturing appointment with the Centre for Ancient Cultures at Monash University, Australia. When I conducted this work I received financial support from Monash University and the Egyptological Society of Victoria, for which I am most grateful.

Plates

- 1 a) plain surface treatment; b) coated surface treatment; c) compacted surface treatment; d) textured surface treatment
- 2 a) rim-top decoration; b) rippling decoration; c) complex decoration; d) imitation-basketry decoration; e–f) impressed decoration; g) fingernail decoration; h) potmark
- 3 a) section of a Fabric 1A sample; b) section of a Fabric 1B sample; c) section of a Fabric 1C sample; d) section of a Fabric 1D sample; e) section of a Fabric 1E sample
- 4 a) section of a Fabric 2A sample; b) section of a Fabric 2B sample; c) section of a Fabric 2C sample; d) section of a Fabric 2D sample
- 5 a) section of a Fabric 3A sample; b) section of a Fabric 3B sample; c) section of a Fabric 3C sample; d) section of a Fabric 3D sample; e) section of a Fabric 3E sample; f) section of a Fabric 3F sample
- 6 a) section of a Fabric 4A sample; b) section of a Fabric 4B sample; c) section of a Fabric 4C sample; d) section of a Fabric 4D sample; e) section of a Fabric 4E sample; f) section of a Fabric 4F sample; g) section of a Fabric 4G sample
- 7 a) section of a Fabric 5A sample; b) section of a Fabric 5B sample; c) section of a Fabric 6A sample; d) section of a Fabric 6B sample; e) section of a Fabric 7A sample; f) section of a Fabric 7B sample; g) section of a Fabric 7C sample
- 8 a) section of a Fabric 8A sample; b) section of a Fabric 9A sample; c) section of a Fabric 9B sample; d) section of a Fabric 9C sample
- 9 a) Hp1 ware (Loc. 002); b) Hp2 ware (Loc. 002); c–d) Hx1 ware (Loc. 002); e) Hx2 ware (Loc. 002); f) Hmd4 ware (Loc. 005); g) Hp1 ware (Loc. 008); h–j) Hp1 ware (Loc. 035); k–l) Hp2 ware (Loc. 035); m) Hp3 ware (Loc. 035); n) Hp4 ware (Loc. 035); o) Hp6 ware (Loc. 035); p–q) Hm1 ware (Loc. 035); r) Hm5 ware (Loc. 035); s–u) Hd1 ware (Loc. 035); v) Hd2 ware (Loc. 035)
- 10 a) Hd3 ware (Loc. 035); b) Hx2 ware (Loc. 035); c) Hp2 ware (Loc. 047); d–e) Hp1 ware (Loc. 048); f–i) Hp2 ware (Loc. 048); j) Hp6 ware (Loc. 048); k–l) Hp2 ware (Loc. 059); m) Hx1 ware (Loc. 059); n) Hx2 ware (Loc. 059); o) Hp1 ware (Loc. 062); p) Hp1 ware (Loc. 068); q) Hp2 ware (Loc. 069); r) Hp4 ware (Loc. 069); s) Hp1 ware (Loc. 069)
- 11 a–b) Hp1 ware (Loc. 069); c–d) Hp2 ware (Loc. 069); e) Hp4 ware (Loc. 069); f) Fabric 8A (Loc. 069); g–h) Hp2 ware (Loc. 070); i) Hm13 ware (Loc. 070); j–n) Hp2 ware (Loc. 071); o) Hm1 ware (Loc. 071); p) Hm12 ware (Loc. 071); q) Hm7 ware (Loc. 071); r) Hx1 ware (Loc. 071); s) Hx2 ware (Loc. 071); t) Hmx1 ware (Loc. 071)
- 12 a) Hp1 ware (Loc. 072); b) Hp22 ware (Loc. 072); c) Hp24 ware (Loc. 072); d) Fabric 4C (Loc. 072); e) Hp6 ware (Loc. 073); f) Hmd1 ware (Loc. 073); g–h) Hd1 ware (Loc. 074); i–k) Hd2 ware (Loc. 074); l) Hd3 ware (Loc. 074); m) Hmd1 ware (Loc. 074); n) Hm2 ware (Loc. 077); o) Hp2 ware (Loc. 093); p) Hm2 ware (Loc. 093); q) Hx2 ware (Loc. 093); r) Hp2 ware (Loc. 094)
- 13 a) Hp2 ware (Loc. 094); b) Hp3 ware (Loc. 094); c) Hx3 ware (Loc. 094); d) Hp1 ware (Loc. 096); e) Hp3 ware (Loc. 096); f) Hp1 ware (Loc. 098); g) Hp2 ware (Loc. 098); h) Hp2 ware (Loc. 100); i–j) Hp3 ware (Loc. 100); k) Hm5 ware (Loc. 104); l–n) Hp1 ware (Loc. 105); o) Hx1 ware (Loc. 105)
- 14 a) Hx1 ware (Loc. 105); b) Hx2 ware (Loc. 105); c) Hp10 ware (Loc. 105); d) Hx4 ware (Loc. 105); e) Hd7 ware (Loc. 105); f) Hp2 ware (Loc. 108); g) Hp1 ware (Loc. 108); h) Hp23 ware (Loc. 108); i) Hp25 ware (Loc. 108); j) Hx8 ware (Loc. 109); k–m) Hp2 ware (Loc. 114); n) Hp7 ware (Loc. 114)
- 15 a) Fabric 1B (Loc. 115); b) Hp3 ware (Loc. 115); c–d) Hp2 ware (Loc. 116); e) Fabric 1A (Loc. 116); f–g) Hp2 ware (Loc. 117); h) Hp3 ware (Loc. 117); i) Hp24 ware (Loc. 117); j–k) Hp2 ware (Loc. 119); l) Hp1 ware (Loc. 131); m) Hp8 ware (Loc. 131); n) Hd1 ware (Loc. 134); o–p) Hp1 ware (Loc. 135); q) Hp2 ware (Loc. 135)
- 16 a) Hp2 ware (Loc. 135); b–d) Hp3 ware (Loc. 135); e) Hp4 ware (Loc. 135); f) Hm2 ware (Loc. 135);

- g) Hm5 ware (Loc. 135); h) Hm9 ware (Loc. 135);
 i) Hmc2 ware (Loc. 135); j) Hmd1 ware (Loc. 135);
 k–l) Hd2 ware (Loc. 135); m) Hx2 ware (Loc. 135)
- 17 a–g) Hp1 ware (Loc. 136); h–r) Hp2 ware (Loc. 136)
- 18 a–o) Hp2 ware (Loc. 136)
- 19 a–p) Hp3 ware (Loc. 136)
- 20 a–h) Hp3 ware (Loc. 136); i) Hp6 ware (Loc. 136);
 j–u) Hp7 ware (Loc. 136); v–w) Hp8 ware (Loc. 136)
- 21 a–b) Hp8 ware (Loc. 136); c) Hp9 ware (Loc. 136);
 d) Hp10 ware (Loc. 136); e–i) Hp24 ware (Loc. 136);
 j–k) Hp25 ware (Loc. 136); l–o) Hm6 ware (Loc. 136)
- 22 a–d) Hm6 ware (Loc. 136); e) Hm4 ware (Loc. 136);
 f–i) Hx2 ware (Loc. 136); j) Hx3 ware (Loc. 136);
 k) Hx1 ware (Loc. 136); l) Hx6 ware (Loc. 136);
 m) Hx7 ware (Loc. 136); n) Fabric 4A (Loc. 136);
 o) Hp2 ware (Loc. 136); p) Hm6 ware (Loc. 136)
- 23 a) Hp2 ware (Loc. 136); b) Hp7 ware (Loc. 136);
 c) Hp1 ware (Loc. 136); d) Hp24 ware (Loc. 136);
 e) Hx2 ware (Loc. 136); f–h) Fabric 1B ware (Loc.
 136); i) Hp7 ware (Loc. 136); j) Hm6 ware (Loc.
 136); k) Hp2 ware (Loc. 136); l) Hp7 ware (Loc. 136);
 m) Hp13 ware (Loc. 136)
- 24 a) Hp2 ware (Loc. 138); b) Hx1 ware (Loc. 138);
 c) Hmx2 ware (Loc. 138); d) Hp2 ware (Loc. 139);
 e) Hp6 ware (Loc. 139); f) Hp24 ware (Loc. 139);
 g–h) Hp25 ware (Loc. 139); i) Hm1 ware (Loc. 139);
 j) Hm7 ware (Loc. 139); k) Hx3 ware (Loc. 139);
 l) Hp3 ware (Loc. 143)
- 25 a) Hp3 ware (Loc. 143); b) Hx2 ware (Loc. 143);
 c) Fabric 1B (Loc. 143); d) Hx3 ware (Loc. 144);
 e) Hp23 ware (Loc. 144); f) Fabric 3B (Loc. 145);
 g) Hp2 ware (Loc. 170); h) Hp3 ware (Loc. 170)
- 26 a) Hp23 ware (Loc. 171); b) Hp25 ware (Loc. 171);
 c) Hp17 ware (Loc. 210); d–e) Hp1 ware (Loc. 212);
 f) Hp20 ware (Loc. 212); g–h) Hm1 ware (Loc. 212);
 i–j) Hm2 ware (Loc. 212); k) Hm5 ware (Loc. 212);
 l) Hmd2 ware (Loc. 212); m) Hmd3 ware (Loc. 212)
- 27 a) Hp2 ware (Loc. 222); b–c) Hx2 ware (Loc. 222);
 d) Hp2 ware (Loc. 224); e) Hp1 ware (Loc. 244);
 f–g) Hp2 ware (Loc. 244)
- 28 a–c) Hm1 ware (Loc. 254); d) Hp20 ware (Loc. 258);
 e) Fabric 2A (Loc. 258); f–g) Hp2 ware (Loc. 380);
 h) Hp1 ware (Loc. 380); i) Hp10 ware (Loc. 380);
 j) Fabric 1B (Loc. 380); k) Hm1 ware (Loc. 381);
 l–n) Hp1 ware (Loc. 382); o–q) Hp3 ware (Loc. 382);
 r) Hx2 ware (Loc. 382)
- 29 a) Fabric 1C (Loc. 382); b) Hx5 ware (Loc. 402);
 c) Hp2 ware (Loc. 402); d–g) Hp1 ware (Loc. 402);
 h) Hx1 ware (Loc. 402); i) Hmc4 ware (Loc. 402);
 j) Hc1 ware (Loc. 402); k) Hc8 ware (Loc. 402);
 l) Hp8 ware (Loc. 402)
- 30 a–w) Hp1 ware (Loc. 404)
- 31 a–s) Hp1 ware (Loc. 404)
- 32 a–k) Hp1 ware (Loc. 404); l–u) Hp2 ware (Loc. 404)
- 33 a–g) Hp2 ware (Loc. 404); h–k) Hp3 ware (Loc. 404);
 l) Hp4 ware (Loc. 404); m–o) Hp10 ware (Loc. 404);
 p–q) Hx2 ware (Loc. 404)
- 34 a) Hc11 ware (Loc. 404); b) Fabric 1B (Loc. 404);
 c) Hp7 ware (Loc. 404); d–e) Hx1 ware (Loc. 404);
 f) Hp8 ware (Loc. 404); g) Hp22 ware (Loc. 404);
 h–m) Hp1 ware (Loc. 406); n–o) Hp2 ware (Loc. 406)
- 35 a–f) Hp2 ware (Loc. 406); g–i) Hp3 ware (Loc. 406);
 j) Hx1 ware (Loc. 406); k) Hx2 ware (Loc. 406)
- 36 a) Hx3 ware (Loc. 406); b) Hc2 ware (Loc. 406);
 c–e) Hp2 ware (Loc. 409); f) Hp4 ware (Loc. 409);
 g) Hp1 ware (Loc. 423); h) Hx1 ware (Findspot 4:
 30/405-M1-1/3); i) Fabric 1A (Findspot 5: south of
 Loc. 002); j) Hx2 ware (Findspot 8: 31/405-M10-1)

Chapter 1

Introduction

This study presents a description, classification and quantitative analysis of the pottery recovered from prehistoric sites in Dakhleh Oasis, south central Egypt (Fig. 1). Surveying conducted during the first field season of the Dakhleh Oasis Project¹ confirmed the existence of rich prehistoric remains on a few sites in the northwest corner of the oasis. Now, after four decades of fieldwork, several hundred Holocene sites have been recorded throughout the oasis yielding a significant quantity of archaeological material including groundstone items, architectural features, rock art panels, animal remains, and a rich array of chipped stone tools. The study of this material reveals an almost continuous sequence of human occupation from the early Holocene settlement of the oasis during the ninth millennium (cal. BC), to the arrival of Old Kingdom colonists during the mid-third millennium, at which time the oasis was drawn into the administrative orbit of the Nile Valley, a state of existence in which it has remained since (Hope 2007; Hope *et al.* in press).

Studies on the Holocene inhabitants have proceeded under the direction of Mary McDonald as principal DOP investigator for the Holocene prehistory. The picture to emerge is one of long-term transformation in the social landscape patterned to shifting environmental conditions. The early Holocene wetting of northeast Africa (Kuper and Kröpelin 2006) saw small groups of hunter-gatherers migrate to the oasis, while improved climatic conditions *c.* 7000 cal. BC resulted in an influx of new arrivals providing a new and more dynamic social environment. The aridity to follow, beginning around 5300 cal. BC, witnessed an abrupt shift in this process, with late Holocene groups becoming increasingly marginalised as the desert dried around them. Broadly speaking, these developments coincide with the cultural sequence for the oasis, which consists of three core units: the *Masara*, *Bashendi* and *Sheikh Muftah*.²

The oldest of these, the *Masara* cultural unit (8300–6500 cal. BC), represents the ‘Epipalaeolithic developmental stage’ in Dakhleh (McDonald 2003, 43). The record consists of short-term campsites scattered across the oasis (Fig. 2), usually identifiable by chipped stone

scatters, grinding equipment, and sometimes a few hearths (*Masara A*). There is also evidence for more settled activities, in the form of stone slab architecture, with sites clustered in an area to the southeast of the oasis proper (*Masara C*). The *Masara A* and *C* variants are believed to be roughly contemporaneous (McDonald 2009, 9).³

The following *Bashendi* unit represents a period of Neolithisation in the oasis, involving two-stage development. The *Bashendi A* occupants (*c.* 6400–5650 cal. BC) continued a settled lifestyle, mostly confined to the southeast of the oasis, with an expanded toolkit and material indications for increased social differentiation (McDonald 2008; 2016).⁴ With the *Bashendi B* occupation (5600–3800 cal. BC) comes the first clear signs for food-production in the form of livestock keeping (goat and cattle). The new subsistence base apparently prompted a reversion to the more mobile lifestyle, though one that maintained elements of increasing social differentiation as evidenced in the material record (McDonald 2002a; 2008; 2016, 189–90). The last period of indigenous occupation belongs to the *Sheikh Muftah* cultural unit, which emerged at the end of the *Bashendi* period and remained active in the oasis into the mid-third millennium (Hope *et al.* in press). These people were highly mobile hunter-herders who may have lived a fairly meagre existence while spending much of their time adapting to the increasingly arid environment (McDonald *et al.* 2001). Some 70 sites have been recorded for the *Sheikh Muftah*.⁵ While these groups seem to have concentrated their activities in and around the oasis lowlands, presumably to tap the last remaining pools of standing water (McDonald *et al.* 2001; McDonald 2013, 179), research in the desert surrounding the oasis also indicates travel beyond the oasis confines (Riemer 2009; 2011; Wagner and Heller 2012, 356–7).

In 2001 the pottery collection became the subject of a new investigation intended to build on the picture of social and economic development in the oasis, providing details where other archaeological materials remain scant. The pottery collection is ideally suited to the task. As a robust material it survives in relatively good condition, it

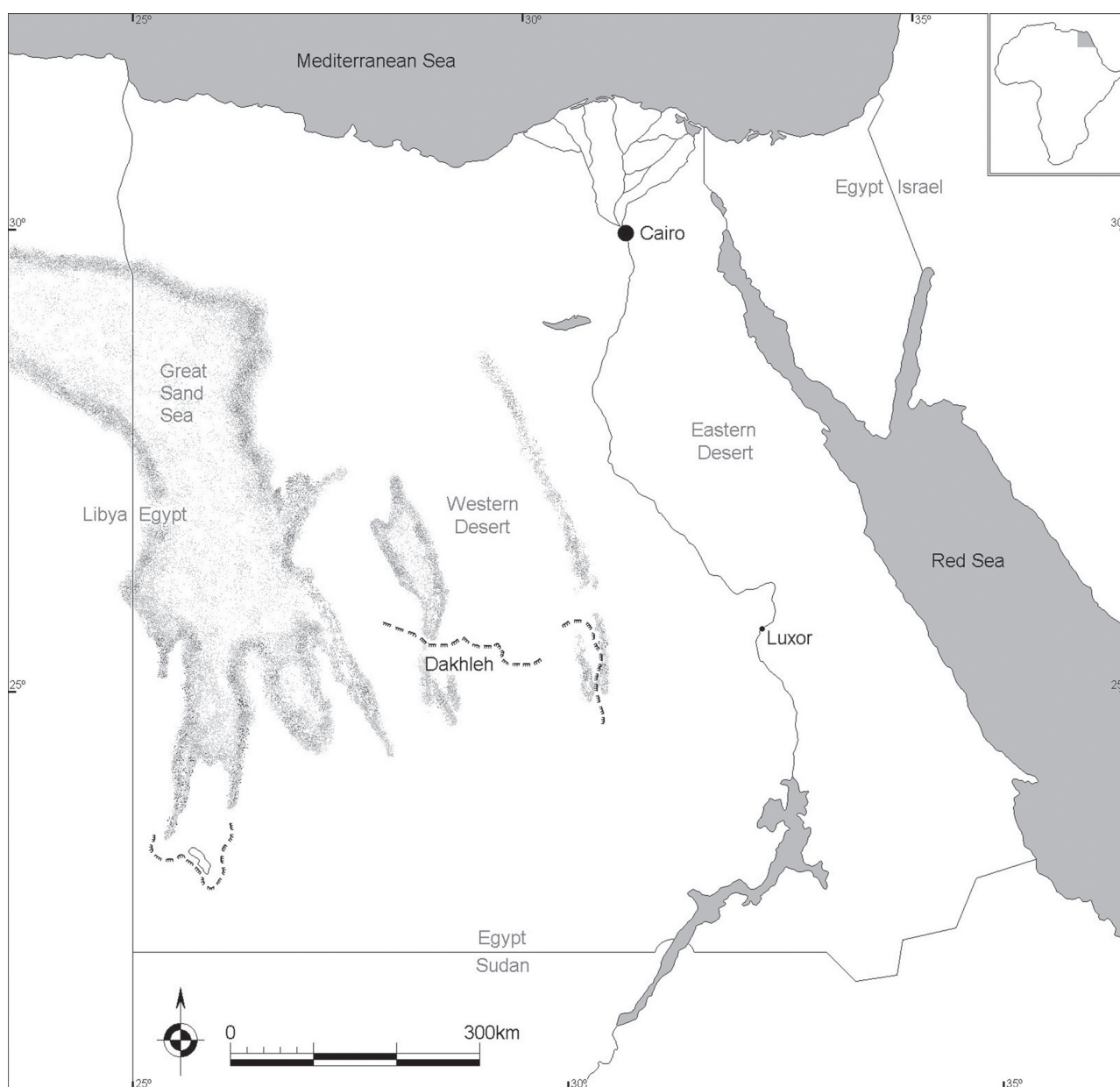


Figure 1. Map of Egypt showing Dakhleh Oasis.

is present on several Holocene sites and well represented on those belonging to the final stages of prehistory, and it demonstrates discrete stylistic variations that can be mapped in time enabling the determination of a cultural sequence and connections to be drawn between sites. While this has already been demonstrated through interim studies on the collection (e.g. Tangri 1992; Hope 2002; Warfe 2006), research is now at the stage of offering a more comprehensive overview that begins with identifying, in more precise terms, the range and types of pottery from early and mid-Holocene sites.

1.1 Methodology and structure of study

Part I of the study sets about doing this in three interrelated steps. It begins by outlining a process for identifying

and describing the range of pottery properties in the collection that are suitable for analysis. The focus rests on fabric inclusions, manufacturing technology, surface treatments and vessel dimensions. A broad set of ceramic properties are present in the collection from which a range is selected to identify fabrics. These are matched with surface treatment to identify wares, forming the second step – a pottery classification. As a ware-based system, the information is scaffolded to produce a definable type. The study then proceeds to an investigation of fabric type, surface treatment and shapes that appear on sites belonging to the three cultural units: the Masara, Bashendi and Sheikh Muftah. As a quantitative analysis this process relies on statistical applications to deal with the large sets of data. It seeks to identify the frequencies

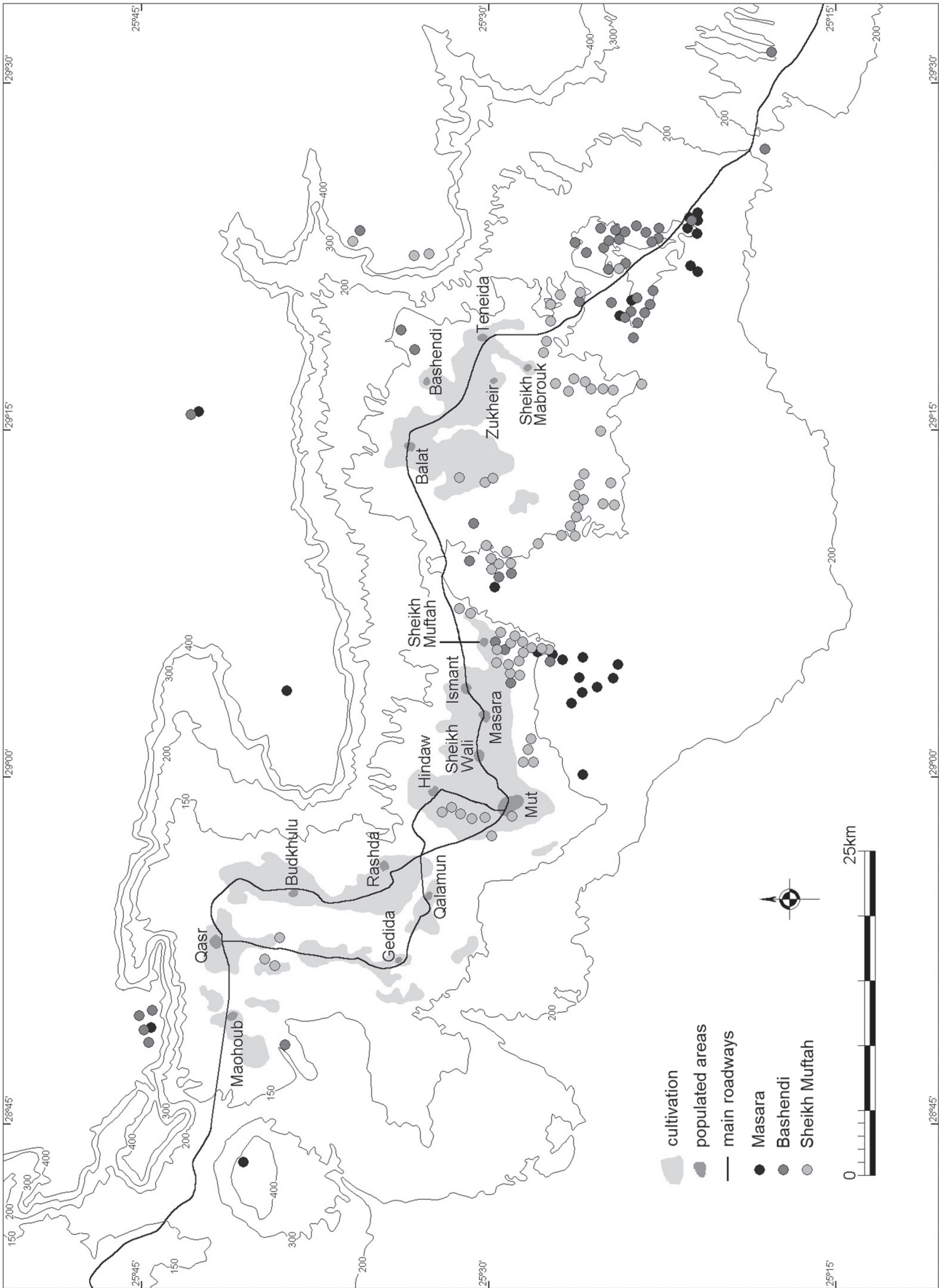


Figure 2. Map of Dakhleh showing early and mid-Holocene cultural unit sites and modern centres of activity.

in which pottery types appear on sites with the aim of establishing patterns amongst the data that are relative to time. Put simply, this final step seeks to characterise the pottery traditions for each cultural unit, drawing attention to the differences and similarities that define each tradition, and in doing so revealing long-term variation in the technology.

By following these steps the study provides a baseline for research, an anchor point for exploring changes in the pottery corpus that point to social developments, economic organisation and cultural boundary formation. All of these are valuable avenues for research that are being pursued as part of the broader investigation (Warfe 2015; 2016; forthcoming a; forthcoming b) but are not included here in the interests of presenting a containable publication upon which interpretations will be grafted in other publications. In short, this study offers a comprehensive *introduction* to the prehistoric pottery of the oasis. It is essentially the first step in the broader program of investigation on the ceramic evidence.

Having made this point, it is hoped that this study will provide a foundation for exploring the Dakhleh tradition within the wider sphere of pottery activity in the Egyptian Western Desert. As a localised study, the focus is necessarily inward looking, though attempts have been made to match the report in substance and style to ceramic studies from elsewhere: the Nile Valley (Nordström 1972; Nordström and Bourriau 1993; Friedman 1994) and desert regions (e.g. Nelson and Associates 2002; and especially the system developing out of the *Arid Climate Adaptation and Cultural Innovation in Africa* (ACACIA) project, see in particular Riemer 2011, 33–73 and also the *North East African Prehistoric Pottery* (NEAPPO) http://www.uni-koeln.de/sfb389/a/a1/a1_informations.htm#riemer6). The objective is to find a common language through which technical information may be shared on an appreciable level. This aim is borne out, partly, in the terminology as well as the technical methods. Many of these are not new to ceramicists and draw from standards long established.

With similar intent, Part II of the study offers grounds for comparison with other ceramic traditions through a discussion of provenance accompanied by thin-section analysis. The Dakhleh inhabitants, like those from neighbouring regions (Wendorf, Schild and Associates 2001; Gehlen *et al.* 2002; Kindermann 2010; Riemer 2011; Barich *et al.* 2014), were not locked in place and thrived as part of a wider cultural complex that extended across northeast Africa from the Western Desert oases to the Nile Valley and into present-day Sudan. This is evidenced by a process in which local Dakhleh adaptations were largely in step with desert-wide developments and also in the spread of cultural materials: amazonite beads and marine shells, Ounan points and the decorated wares identified by Arkell (1949; 1953) and reported widely across the Sahara (Riemer and Jesse 2006; Jesse 2010). Although the Dakhleh pottery tradition does not belong

directly to the decorated tradition (Warfe 2003b; 2006), both were nonetheless part of the material assemblage through which social relations were operationalised and transmitted regionwide. Other examples drawn in Part II extend to the Nile Valley and elsewhere in the Western Desert.

1.2 Research history on the pottery collection

The ceramic objects forming the subject of this book come from 96 registered sites and five findspots⁶ within the DOP concession zone – the appendix provides a list of sites and associated pottery finds. With the exception of a few pieces, now housed in the Royal Ontario Museum, the collection is kept in field facilities provided by the Dakhleh Oasis Project. The objects in the museum and some finds reported by Hope (2002) are not analysed in the current study.⁷ Notwithstanding these pieces, more than 10,000 sherds were examined forming what is now the most comprehensive study of the early Dakhleh pottery.

Some of this material has been examined previously and published as part of the ongoing researches of the DOP. In all cases, studies were performed by Colin Hope as principal ceramicist for the Dakhleh Oasis Project or by analysts working under Hope's supervision: in the late 1980s Daniel Tangri (1989) examined part of the collection for his undergraduate Honours thesis at Sydney University, Australia, and in the late 1990s Mark Eccleston (1997) analysed several samples as part of his undergraduate Honours thesis at Monash University, Australia. In 2001 the collection was offered to the current author for research purposes.

The publications stemming from earlier studies appear mostly in the form of brief field reports (Hope 1979; 1980; 1981; 1983) or concise overviews (Edwards and Hope 1987; 1989; Hope 1998; 2002; 2007; Hope and Tangri 1999). Other than this, the list includes publications by Tangri (1991a; 1991b; 1992), Eccleston (2002) and myself (McDonald *et al.* 2001; Warfe 2003a; 2003b; 2005; 2006; 2015; 2016; see also Warfe forthcoming a; forthcoming b; Jamieson and Warfe 2005a; 2005b; Warfe and Jamieson 2006). A two-page contribution by Segnit in Edwards and Hope (1987) completes the list.

With the exception of Hope (2002), these publications are mostly characterisation studies based on individual samples or small selections of material. They differ more in methods of analysis than overall aims: the studies are generally focussed on identifying temporal trends in the collection as well as imports. The methods of analysis have included macroscopic identifications of fabric, surface treatment and shape (Hope 1979; 1980; 1981; 1983; Edwards and Hope 1987; 1989; Tangri 1991a; 1992; Hope and Tangri 1999; Warfe 2003a; 2003b; 2005; 2006), thin-section analyses (Eccleston 2002 and section 6.2 herein) and Neutron Activation Analysis (arranged by Daniel Tangri, performed by analysts at

Sydney University, and reported by Eccleston 2002). A recent expansion of research aims has also seen a series of papers published on experimental studies that examine the pottery-production process in the oasis (Jamieson and Warfe 2005a; 2005b; Warfe and Jamieson 2006; Warfe 2015; 2016; see also Warfe forthcoming a). Where appropriate, the findings from these studies are incorporated into the current work.

1.3 Points of clarification

Before proceeding to the analysis it is important to draw attention to a few key points on the Dakhleh pottery that may conflict with generally held assumptions about early ceramic material from northeast Africa. One of these relates to the find context. None of the ceramic objects analysed for this study come from burials. They derive instead from settlement sites that display evidence of living activities (hut circles, hearths, chipped stone scatters, etc.), or sites for which there is no other evidence of human activity – i.e. a findspot. Although a handful of prehistoric burials have been discovered in the oasis, these were bereft of material culture with the exception of a single copper pin (Thompson and Madden 2003, 72). This suggests that pottery was not directly integrated into the funerary customs of the early oasis inhabitants as it was in the Nile Valley, and as we are beginning to see in Neolithic burials elsewhere in the Western Desert (Kobusiewicz *et al.* 2009; Gatto 2010). Yet the paucity of burials so far discovered in the oasis warns against drawing this conclusion outright. The number of known burials is at odds with the level of human activity recorded in the oasis during prehistory, and we hope to eventually find burial sites that represent this activity. Such a discovery could, of course, present new data on the early Dakhleh pottery traditions.

On the find context, it is important to reiterate that the pottery comes from multiple sites spread across an area roughly 70 km × 20 km (Fig. 2). Many of these are located in the oasis lowlands, in areas occupied today – and throughout ancient times and more recent history – by the oasis inhabitants. Human traffic and environmental factors have degraded these sites, several of which are now completely deflated. In most cases the pottery has been collected from surface contexts and this has shaped the analysis to observe horizontal relationships between sites on the basis of the pottery finds.

Relative to the find context is the preservation of the ceramic material, which is not ideal, having been exposed to the elements and in some cases human interference. The result is a pottery collection characterised by small, often heavily eroded sherds. There are virtually no examples of complete vessels, and many instances in which the original surfaces have been removed. This too has implications for the analysis, with the focus being on fabric and surface treatment more so than shape, as this is not always determinable. This situation is not enabled by the fact

that pottery is very rare, especially on earlier sites. This rarity will come as no surprise to colleagues working in the desert regions (e.g. Close 1995; Gehlen *et al.* 2002; Nelson and Associates 2002; Barich 2013, 447; di Lernia *et al.* 2013, 10; Muntoni and Gatto 2014, 445; Vermeersch *et al.* 2015, 482), in contrast to the apparent richness of ceramic material recovered from Nilotic sites in Egypt and the Sudan from roughly contemporaneous contexts (cf. Friedman 1994; Haaland 1995, 160).

As for the pottery itself, the material is not particularly elaborate unlike early collections elsewhere (Barnett and Hoopes 1995 *passim*; Rice 1999). There are no appendages (in the form of feet and handles) present in the collection, vessel shapes are basic, and decoration is rare. The collection can be fittingly characterised as unremarkable. The infrequency of decoration is especially noteworthy. There are only few decorated examples to speak of, some of which are almost certainly imports and not products of a local tradition. Applying decoration was clearly not a priority to the oasis potters, a point raised in contradistinction to the well known, extensively decorated ‘Khartoum-related’ material circulating across Saharan Africa from the tenth millennium cal. BC onwards (Close 1995; Kuper 1995, 129; Gatto 2002a, 74–7; Jesse 2003; 2010; Holl 2005 176–8; Lange 2006; Riemer and Jesse 2006; Huysecom *et al.* 2009; Jórdeczka *et al.* 2011; Barich 2013, 446–9; see also the *Céramique Africaine Imprimée* project: <http://lampea.cnrs.fr/cerafim/?lang=en>). Naturally, the analysis reflects the general absence of decoration with its focus primarily on fabric, more so than surface treatment.

Lastly, there is little proxy evidence to support the manufacture of pottery in the form of kilns, clay firedogs, or other firing equipment from early and mid-Holocene sites. The assumption is that the firing process probably involved a bonfire on site that was put to various other uses. Notwithstanding, the pottery itself forms a critical body of material culture that represents the beginning of a new technology in the oasis, and one that was responding to the social and economic needs of the oasis inhabitants, whatever these were precisely, while helping to condition these needs through production and application. This study will go some way in situating the pottery tradition within the known cultural sequence for the oasis, and exploring the changing nature of the technology over time.

Notes

- 1 The Dakhleh Oasis Project (DOP) had its first season in 1978 as a survey jointly sponsored by the Royal Ontario Museum and the Society for the Study of Egyptian Antiquities (Mills 1979). Research by project members is conducted on prehistoric, ancient (Pharaonic/Roman/Christian) and modern (Islamic) sites throughout the oasis and its desert borders. A mission statement, acknowledgement of funding bodies, excavation reports and bibliography of DOP publications can be found at <http://artsonline.monash>.

- edu.au/ancient-cultures/excavations-in-dakhleh-oasis-egypt/. See also Mills (2007) for an update on project accomplishments and future directions.
- 2 The names given to these units derive from modern villages in the oasis close to where sites were first located (Fig. 2). Strictly speaking there are no 'type sites', though there are sites that typify the unit, forming the basis for the unit characterisation. For general discussions on each unit see McDonald (1991a; 1991b; 1992; 1993; 1996; 1998; 1999b; 2002a). For more detailed studies including site reports and dating on the Masara see McDonald (1986; 1991c; 2002b; 2003; 2007; 2009); the Bashendi (McDonald 1985; 1986; 1990a; 1990b; 1990c; 1990d; 1999a; 2002c; 2008; 2013; 2016; McDonald and Walker 1999); and the Sheikh Muftah (McDonald 1985; McDonald *et al.* 2001; see also Jeuthe 2014). For reports on the Holocene fauna see Churcher (1986; 1992; 1999b; 1999c; Churcher *et al.* 2008); on the flora see Thanheiser (2011), bioanthropological remains Thompson and Madden (2003; 2006), and on rock art Polkowski *et al.* (2013) which includes an up-to-date bibliography on the work conducted by the Polish team beginning under the direction of Lech Krzyżaniak.
 - 3 The Masara B variant, identified early in the investigations (McDonald 1991c), is now treated as a specialised component of the Masara A (McDonald 2003, 43).
 - 4 The Bashendi A is further sub-divided into Early and Late phases primarily on the grounds of architectural features, present only on Late A sites, and the lithic toolkits – collections from Late A sites include Bashendi B elements including pottery (McDonald 1998, 132–3).
 - 5 Early and Late phases have been determined for the Sheikh Muftah based on the ceramic assemblage (Hope 2002; see also section 4.6), though no absolute dates are available for this division. A 'Terminal' phase has also been proposed (Warfe 2008, 36; Hope and Pettman 2012), to accommodate new ceramic material coming to light through excavations, principally at Mut al-Kharab (see also Warfe 2005 and Hope *et al.* in press).
 - 6 The term 'findspot' denotes an unregistered site in the oasis from which the remains of a single vessel have been collected. The site remains unregistered due to the absence of any other material culture, and the assumption that the sherd(s) come from a vessel that was inadvertently discarded in this location, or swept into position through pluvial and/or aeolian action. The appendix offers an explanation for the site/locality numbering system.
 - 7 After being studied by Hope these were temporarily misplaced and some were relocated after the current analysis took place. These objects will be examined in future field seasons but the results are not expected to alter the broad conclusions drawn here. Some important examples that feature in Hope's (2002) publication not analysed in the current study include the jar from Loc. 074 that is possibly associated with the Ma'adi complex (Hope 2002, 43–5, Fig. 1t), a decorated sherd also from this site (Hope 2002, Fig. 1c) along with three decorated sherds from Loc. 035 and an example from Loc. 024 (Hope 2002, Pl. 56, Fig. 6n), a spoon from Loc. 135 that Hope (2002, 48; see also Edwards and Hope 1987, Fig. 2f) compared with Mostagedda material (Brunton 1937, 36–7, Pl. XVIII), some near complete vessels from Loc. 222 (Hope 2002, Figs 9–10), and the example of the Tasian beaker from the vicinity of Loc. 304 (Hope 2002, 48). In addition to this, Thompson and Madden (2003, 72) report some pottery finds from Loc. 375 that could not be located for analysis, and McDonald (1986, 108; 1990b, 42, 49) reports on pottery finds from Locs 075, 229 and 250, only one of which is recorded herein.

PART I

Chapter 2

Technology, terminology and description

Upon first impression the early Dakhleh pottery seems quite homogenous, as others have noted for collections elsewhere in northeast Africa (e.g. Caneva 1988, 70; Gatto 2002a, 65). When spread across the laboratory table, the pottery appears gritty, with uneven surfaces, reddish-brown colours, and fairly standardised shapes. Yet closer inspection begins to reveal some important variation in the collection. Placed side-by-side and examined under the same criteria, almost all sherds exhibit differences in thickness, colour, surface texture, groundmass texture and zoning. These variations lie at the core of this study and are key to building the analytical constructs that enable classification of the material.

This chapter identifies and describes the differences within the collection that form the basis for analysis. Written as a technical report, it draws on concepts and terminology adapted from standard works, most notably Nordström's (1972) seminal study, which itself borrows from earlier publications (e.g. Shepard 1965). The intent is to place the reader on familiar ground, using nomenclature that is becoming more common to ceramic analyses in northeast Africa (Nordström and Bourriau 1993; Friedman 1994; Nelson and Associates 2002; Riemer and Schönfeld 2010; Riemer 2011).

2.1 Methods of analysis

A sample of 76 sherds was selected as a representative database, embodying the range of variation found among fabrics in the collection. It was necessary to develop a system of analysis appropriate for the field, and accordingly all descriptions are based on macroscopic observation, by eye, or using a low-powered microscope: ×6.7–40 portable binocular Olympus SZ-40. Colour readings were based on a standard *Munsell Soil Color Chart* (Munsell Color Company 2000), and hardness tests were taken with minerals found in Mohs' hardness scale kit. For consistency, all detailed recording was undertaken by the one analyst. Ideally, this should have occurred under the same lighting conditions though in practice

this was not practicable. Finally, whenever possible, fabric descriptions were based on fresh breaks made at an angle parallel to the rim. The breaks were not polished afterwards, as is sometimes the process, as this can blur the section and complicate identifications.

2.2 Fabric description

Following Nordström (1972, 40), the concept of fabric is defined here as a combination of the physical and chemical properties of the clay and non-plastic inclusions that exist within the ceramic body. Also described as fabric are technological features that relate to firing conditions, wall thickness and construction techniques. The various fabric properties are categorised according to groundmass, inclusions and technological properties.

2.2.1 Groundmass

When describing the groundmass of fabrics, the classification includes comments on the texture of the clay body, in addition to the zoning, colour and fracture of the section.

CLAY

Little is known of the Dakhleh clays in terms of composition and there is inadequate information on specific clays exploited during prehistoric and historic times. This reinforces the need to conduct more systematic studies on the oasis clays; at this stage only a few general comments may be made.

The oasis clays are of the secondary or sedimentary type, deposited through a combination of marine and lacustrine action (Kleindienst *et al.* 1999). While today the sedimentary clays are found mostly in dehydrated formations, in the past the clays could have been extracted from watery suspensions, or muds. Calcium carbonates are present in the clays and so too are iron oxides. This makes their identification difficult as they are not obviously 'marly'. If anything, there appears to be a higher content of ferruginous compounds: the vast majority of finds are fired red/reddish-brown (2.5YR 4/4–5/6; 5YR 4/3–5/4)

or brown/greyish-brown (7.5YR 5/2–4/4; 10YR 5/2–5/3) in colour.

TEXTURE

Even at $\times 40$ magnification, the texture of the groundmass can be difficult to ascertain. This property is recorded as ‘closed-bodied’, ‘medium-bodied’ or ‘open-bodied’, though these terms are not overly useful for distinguishing one fabric from the next. They serve only as a general observation on the texture of specific fabrics. While ‘texture’ typically refers to the size of particles that constitute the groundmass (Nordström and Bourriau 1993, 149), in the fabric descriptions porosity is also taken into account.

FRACTURE

The fracture, or the edge of a freshly broken section, is recorded as ‘even’, ‘semi-even’ or ‘uneven’ based on the cleanness of the break. The measures are relative, but provide some sense of the texture of the groundmass as well as the fineness of inclusions. As a rule, fractures with greater unevenness – i.e. jagged edges – are recorded for the coarser fabrics.

ZONING AND COLOUR OF SECTION

The zoning and colour of the fracture were recorded primarily for what they reveal about the relationship between groundmass and firing conditions. Due to the rich iron content of the local clays, the colours of the section are usually a mixture of red, brown and grey. In the event that a significant quantity of vegetal matter was originally present, the colour of the section is usually darker, generally brown or grey, and often zoned. Colour is recorded using the alphanumeric code that features on the seven standard panels 10R, 2.5YR, 5YR, 7.5YR, 10YR, 2.5Y and 5Y and two gley panels of the *Munsell Soil Color Chart* (Munsell Color Company 2000).

The appearance of zoning is generally a by-product of insufficient firing temperature and/or duration of firing (Rice 1987, Table 11.3). Two types of zoning occur in the collection: sections that become gradually darker from the exterior surface towards the interior surface, and sections that have a darkened core with lighter margins or outer zones. Often the transition between zones is blurred, especially among fabrics with coarser inclusions.

2.2.2 Inclusions

Included in this category are all non-plastic inclusions larger than 60 microns (0.060 mm). The most commonly occurring inclusions are sand and shale while limestone appears in slightly lesser frequencies. Other non-plastics include vegetal matter, microfossils, gypsum and what are referred to here as ‘clay aggregates’. The mineral inclusions can be found throughout the oasis and this makes it especially difficult to locate any one region that was primarily sourced for raw materials. In many cases it is also difficult to distinguish between non-plastics that

were naturally occurring in the potter’s paste and those added intentionally.

Given the various types of inclusions, descriptions of particle size are based on one of three scales. Sand and gravel inclusions are classified in accordance with the standard Wentworth scale (Table 1). The size descriptions of other inclusions that possess roughly the same height, length and width dimensions, such as limestone particles, are recorded in Table 2. Size descriptions for elongate or platy inclusions (for instance, shale or vegetal particles that have a length or width more than three times that of the height) are recorded in Table 3.

The frequency of inclusions was approximated using visual comparator charts from Matthew *et al.* (1991). Although this method of quantification cannot be considered precise, it was found that on the few occasions when counts were taken these corresponded roughly to estimations based on these charts. Frequency labels are recorded in Table 4.

SAND AND GRAVEL

Sand is frequently present as an inclusion, though its dispersion among fabrics can differ significantly. The

Table 1. Wentworth scale (taken from Wentworth 1922, Table 1)

Particle size	Description	
<4 μm	clay	
4–60 μm	silt	
60–125 μm	very fine	} sand
125–250 μm	fine	
250–500 μm	medium-textured	
500 μm –1 mm	coarse	
1–2 mm	very coarse	} gravel
2–4 mm	granule	
4–64 mm	pebble	
64–256 mm	cobble	
>256 mm	boulder	

Table 2. Measurement scale for roughly equidimensional particles

Particle size	Description
<250 μm	very fine
250–500 μm	fine
500 μm –1 mm	medium
1–2 mm	coarse
2–4 mm	very coarse
>4 mm	extremely coarse

Table 3. Measurement scale for elongated particles (scale refers to longest axis of particle)

Particle size	Description
<500 μm	very fine
500 μm –1 mm	fine
1–2 mm	medium
2–4 mm	coarse
4–8 mm	very coarse
>8 mm	extremely coarse

Table 4. Frequency scale for inclusion percentages

Percentage	Description
<5%	rare
5–10%	few
10–25%	common
25–50%	frequent
50–70%	dominant
>70%	profuse

size of particles can range from very fine to very coarse (Table 1), and examples of gravel particles up to 4 mm have been detected. The particles can be angular in shape, though the majority are sub-angular, sub-rounded or rounded (for distinction see Nordström 1972, Fig. 3), and come in a variety of colours including black, green, red, orange and grey. Translucent particles are also common.

The frequencies of sand particles give some indication of how they came to be in the paste. Experimental studies have shown that a small quantity of sand appears naturally as an inclusion (Warfe pers. observ. 2003). A greater dispersion of sand could therefore indicate tempering by the potter for intentional reasons, such as improving the workability of the clay, or perhaps by less intentional means, such as working the clay on a sandy bed.

SHALE

The term ‘shale’ is used here in reference to a variety of non-plastic inclusions that derive from mudstones, claystones and/or shales (M. Kleindienst pers. comm., 2001). These are found scattered across the oasis surface and embedded in geomorphological lenses. As Eccleston (2002, 70 fn. 4) points out, the term is used liberally and refers to a number of non-plastic inclusions that are platy or lath-like in form. Although this can result in the misuse of the term shale, it is retained for matters of convenience and consistency.

Shale particles are almost always platy or lath-like. They can be flaky and brittle to the point that the larger particles may be splintered by hand. Particles range in length from <0.250 mm to 14.0 mm, and appear in various colours including light green-grey, pale yellow or olive (5Y 6/4–7/4), red (10R 4/6–5/8), grey (2.5YR 5/1) and dark grey/black (2.5YR 2.5/1–3/1). Often the coarser particles are found in random orientation in the section whereas the finer particles conform more to a partial preferred orientation (for distinction see Rye 1981, Fig. 41). While particles can appear naturally in selected clays, it is probable that the larger inclusions were added as temper (Warfe forthcoming a).

CLAY AGGREGATES

This term refers to clumps of clay that appear in the matrix. Aggregates are roughly equal in height/width/length dimensions and usually stand out from the groundmass for their contrasting colours. They can appear frequently

in the matrix and can range in size from fine to coarse. While it is unclear how the aggregates form, one tentative explanation is that two clay sources have been mixed (see also section 6.1). Whether this was intentional or naturally occurring cannot be determined until further analysis is conducted.

LIMESTONE

Limestone is found throughout the oasis in various geological deposits (Kleindienst *et al.* 1999, Table 1.1) and intermixed with the clays, which explains its frequent occurrence in pastes. Particles are often fine or medium in size, and their distribution can vary significantly. As the particles are generally white, or sometimes pale grey in colour, they stand out from the usually darker coloured matrix and are often easy to detect by eye. As calcium carbonates decompose somewhere above 650°C (Rice 1987, 98), it is common to find that limestone particles are no longer present in the fabric. Still, their original presence may be detected through the remaining ‘halos’. These are generally pale yellow in colour and surround small voids in the section and on the surface. It is unknown whether limestone was added intentionally to the paste. Its ubiquity throughout the oasis would suggest an unintentional occurrence, though the appearance of coarse angular particles in some instances would indicate the deliberate crushing of limestone for tempering purposes.

GYPSUM (ANHYDRITE)

Anhydrite, or gypsum, is another calcium (sulphate) inclusion that can be found in various areas across the oasis (Kleindienst *et al.* 1999). Particles are usually angular or sub-angular in shape, and milky-white or very light-grey (5Y 7/2) in appearance. Occasionally the gypsum can appear translucent. Whenever present, gypsum is common in quantity and one particular fabric includes very coarse particles suggesting intentional inclusion.

VEGETAL

In most cases, the vegetal matter introduced into the paste was subsequently burnt out during firing, leaving voids or organic ‘pseudomorphs’ (Rye 1981, 62). These are often detectable due to the residual carbon that surrounds the void. In general, the size, dispersion and orientation of the vegetal inclusions can be determined from the voids or the carbon markings. Occasionally the imprint of the inclusion is preserved to the point that the type of organic matter may be identified. As the coarse vegetal matter could not make its way into the paste without the potter’s knowledge, it is assumed that such inclusions are intentional: it is not clear whether the finer vegetal inclusions were introduced by way of animal dung temper.

Vegetal inclusions take two shapes: elongate, where the length of the inclusion is at least twice that of its width; and roughly equidimensional, in which the length, width

and height of the inclusion are roughly the same. The elongate vegetal inclusions are usually medium or coarse in size and can be common or frequent in distribution. These have been identified by Ursula Thanheiser (DOP archaeobotanist, pers. comm., 2001), as the ‘off-cuts’ of cereals – stems, casings, etc. As for the equidimensional or rounded vegetal inclusions, the identification of these is not certain though they could be cereal seeds, rather than off-cuts. While this identification requires confirmation, it is notable that seed-tempered pottery has been identified in neighbouring regions.¹

MICROFOSSILS

Microfossils are rarely recorded in this classification as they are very difficult to detect even at $\times 40$ magnification: thin-section analysis has revealed examples of planktonic and benthic foraminifera that were overlooked during macroscopic examination. Attempts at sourcing areas from which the microfossil inclusions derive is currently impracticable as microfossils can be found throughout the oasis mixed in with the limestone beds (Kleindienst *et al.* 1999, 4–7). Given the size of the microfossils it might be assumed that these appeared naturally in the potters’ paste.

2.2.3 Technological properties

Included in this category are the hardness and wall thickness of fabrics, and the technological methods relating to construction technique and firing process.

HARDNESS

Scratch tests to determine abrasion were conducted on samples though the relatively uniform results, with most samples falling within Mohs’ hardness bracket 2.5–3.5, cast doubt on the value of such tests. In any case, the scratch resistance of the samples is recorded as low (2–3 Mohs), medium (3–4 Mohs) and high (>4 Mohs).

WALL THICKNESS

As might be expected, the thickness of a vessel’s walls can vary considerably due to manufacturing irregularities and as walls typically thicken towards the base. It was useful therefore to take several measurements to define the typical range of thickness for each fabric. Most vessel walls were found to be somewhere between 4.5 and 11.5 mm.

CONSTRUCTION TECHNIQUES

While all vessels were handmade, the precise method of construction cannot be determined in many instances. Presumably it involved one of several techniques commonly employed by non-wheel-using potters (for examples see Rye 1981, 66–72; Rice 1987, 125–8; Arnold 1993, Fig. 8). Of the construction techniques that are identifiable, coiling appears most frequently. Examples can be seen with subtle surface undulations, usually found on the vessel interior, or exposed coil joins. Examples of

slab-building and the pinch-and-hollow technique have also been recorded. Although it might be assumed that a combination of techniques were employed by the potter in forming each pot, no examples of this have been detected. As the majority of material does not reveal construction methods, specific forming techniques cannot be associated with specific fabrics.

FIRING CONDITIONS

Referred to as the ‘firing index’ by Nordström (1972, 43), this category is concerned with the three components of the firing process that permanently alter the physical and chemical state of the paste: temperature, duration and the firing atmosphere (i.e. the balance between a reduced, oxidised and neutral environment). This third component depends much on the structure used in the firing process.

It is almost certain that the pottery was fired by way of open firings, which may or may not have involved pits (for distinction see Nicholson 1993, 106).² The duration of the firing could have been only a matter of hours (Warfe forthcoming a), and the temperatures reached in some instances may have exceeded 825°C (Edwards and Hope 1987, 4). In other instances, temperatures appear to have been much lower. Several sherds from Bashendi sites are especially soft suggesting low firing temperatures and/or firings of short duration. The presence of blackened rims indicate that some vessels were inverted for firing.³ The prevalence of fire clouds points to a mixed reduced/oxidised atmosphere, inherent to open firings (Rye 1981, 25; Rice 1987, 109).

2.3 Surface treatment description

The surface treatments that appear in the collection are classified as plain, coated, compacted, textured and decorated. Vessels bearing more than one treatment also occur and are classified as such (e.g. compacted-and-coated). While the literature on surface treatment uses relatively standardised terminology, most concepts and terms are sufficiently fluid in definition to take on different meanings depending on the nature of the material record and/or the analyst’s interpretation of their material. In the current case, appearance and texture, or tactility, form the main criteria for classification.

2.3.1 Plain

A plain surface is one that does not display any form of alteration brought about by any of the treatments detailed below, with two exceptions. Included in this category are surfaces that bear self-slips and surfaces that show signs of being hand-smoothed or wiped (Pl. 1a). The latter is, in fact, a form of compaction (below) but one that exists as a continuation of the construction process. As the clay particles are not sufficiently packed together to produce the feel or appearance typical of a highly compacted surface, the hand-smoothed and/or wiped surface can

be classified as plain. Likewise, the self-slip is also a continuation of the construction process and should not be seen as a separate treatment (Rice 1987, 151). The self-slip, or wet slip, is produced from the same mixture as the paste. It is sometimes gritty in texture from sand and other inclusions finding their way into the mixture, and fires the same colour as the fabric, which makes it difficult to detect especially if the application was thin. Occasionally a self-slip can take on a dark purplish-blackish appearance if the vessel was fired in a heavily reduced atmosphere.

Generally speaking, plain surfaces can be smooth or coarse depending on the size and frequency of non-plastic inclusions and the degree of hand-smoothing/wiping or self-slipping. Plain surfaces can also be even or uneven, and the fired colour/s are usually red, reddish-brown and/or greyish-brown. It is difficult to envisage a circumstance in which a vessel's surface would not be altered in some manner during the final stages of construction. Special care was thus taken in examining plain surfaces for treatments that have been mostly removed through abrasive use-alteration factors or any number of post-depositional factors.

2.3.2 Coated

The only type of surface coating observed in this collection is the 'slip' defined as a '... fluid suspension of clay in water.' (Rye 1981, 41) applied to the vessel before firing. Two types of slip are identified. One is the self-slip, recorded as a plain treatment for reasons stated above. The other is a red (or coloured) slip, which is classified as a coated treatment. This slip renders the surface a reddish-brown or dark red (5YR 5/3–5/4; 10R 3/6–4/6) colour (Pl. 1b). This is distinguished from the self-slip as the preparation involves the addition of colourants. Although compositional analyses of the red slip have not been conducted, the colourants are most likely iron-based, possibly ochre.

2.3.3 Compacted

The term compaction is used in reference to a surface in which the clay particles have been realigned by rubbing or patting, generally with a hard implement (Rice 1987, 136–8). The resulting effect is a clay surface rendered less permeable, tactually smooth, often with a lustre.

Depending on the potter's intent, tool used, and amount of time invested on an individual vessel, different degrees of compaction can be achieved. For current purposes, the term compaction is used to identify surface treatments that maintain a tactual smoothness and/or visible lustre (Pl. 1c), often referred to as a polish or burnish (Rice 1987, 138). Care must be taken to distinguish this treatment with the desert patina that produces a similar appearance and feel.

2.3.4 Textured

A textured surface is one that has been intentionally manipulated in a manner that produces a highly irregular

feel and appearance. In the current study, the main kind of surface texturing is a form of rilling in which finger channels have been impressed into the exterior surface of the vessel. Typically, these channels are oriented vertically starting somewhere on the lower body and terminating just below the rim. Rills are usually quite shallow (between 1.0–3.0 mm in depth), and range in width between 5.0 and 15.0 mm. They are often close to one another, though not evenly spaced, and it is common to find overlap (Pl. 1d). Examples of rills orientated on an oblique or lateral axis have been recorded and rills occasionally appear also on interior surfaces.

The rills were produced by potters running their fingers down the surface of the vessel while the clay was still malleable (Warfe 2016; forthcoming a). In some instances the spacing of the rills gives the impression that the potter used all four fingers to produce this effect. While these might appear to be the result of slapdash construction, their conspicuity and recurrence indicates they are not to be treated as unintentional.

At this point a distinction should be made between rilling and isolated finger marks and scratches that also appear on vessel surfaces as an inadvertent result of the construction process.⁴ In most cases, the distinction between intentional and unintentional texturing (as defined here) can be made with confidence.

Although similar in name and appearance, the rilled surface should not be confused with the 'rippled' surface identified as a decorative motif (below). Nor is rilling considered a form of decoration, even if it has been identified as such in the form of 'fluting' (Sharpe and van Gelder 2006). The rilling seems to have been applied as a finishing technique possibly for functional purposes (Warfe 2016).

2.3.5 Decorated⁵

Following regional trends in classifying the decorated pottery of northeast Africa (Caneva 1987; 1988; Gatto 2002a) the distinction is made here between techniques or 'processes'⁶ used in decorating the surface, and the design elements and motifs. Seven combinations of technique and design have been identified in this collection.

TECHNIQUES

Of the range of techniques that may be used to decorate a pot (e.g. Shepard 1965, 193–213), only incision and impression were identified. Both techniques were applied in the stage of production when the paste was still relatively malleable. A number of short incisions seem to have been produced by fingernails. Longer incisions could have been produced with sticks, shells or the edges of worked flint. Implements used for impression were presumably the same as those identified elsewhere: combs made of bone fragment, pottery sherds, ostrich eggshells or other types of shell (Caneva 1987, 235–6, Fig. 9.1.5–6; Gatto 2002a, 68; see also CerAfIm Article 219 'Analysis

of tools for decoration' <http://lampea.cnrs.fr/cerafim/spip.php?article219>).

DESIGN ELEMENTS AND MOTIFS

A number of design elements and motifs have been identified. In its current usage, 'elements' refers to the form that the incision or impression take (e.g. dots, dashes, lines), while 'motifs' are the arrangement of elements (e.g. geometric patterns). Ideally, the motifs would be described in terms of their location on the vessel and any relational position held with other motifs, forming the so-called 'structure of design' (Shepard 1965, Fig. 36). Unfortunately most of the decorated sherds in the collection are too small to determine the position on the vessel and some are even too small to appreciate the full extent of the motif.

Rim-top decoration: patterns located on the lip of the rim and executed by impression or incision. The two kinds of rim-top decoration are 'milled rims' and 'notched rims'. The former denotes thin lines in either simple parallel patterns (Pl. 2a), or cross-hatched patterns (Pl. 9s–u), produced by pressing or dragging a sharp implement (fingernail?) across the rim. The notched rim is a more exaggerated example of the simple parallel patterns. In this case, notches (Pl. 12f) are produced by the removal of small areas of the rim-top by means of incision or gouging.

Rippling: a design produced by dragging an implement such as a bone comb down the vessel surface to produce a series of channels, or 'ripples'. The channels are evenly spaced and quite shallow and can be vertical or oblique in orientation: examples of the latter are always oriented right-to-left from the rim (Pl. 2b). The undulating appearance of rippled surfaces is the result of smoothing the surface after the channels were made.

The precision in which this design is executed and the uniformity of the channels distinguishes the ripples from the textured rills described in subsection 2.3.4. There is little doubt that the rippled surface treatment was intended as a decoration, akin to ripple wares characteristic of the Badarian and A-Group traditions (Brunton and Caton-Thompson 1928, 20; Nordström 1972, 46–7).

Incised and impressed 'complex' patterns: a number of design elements and motifs fall into this sub-category. In most cases the designs are a combination of impressions, or punctates, and incised lines arranged in geometric patterns that are situated within lateral zones demarcated by incised lines (Pls 2c and 12g–j).

These form the more elaborate designs in the collection incorporating various patterns and a clear sense of design structure in terms of placement on the vessel and aspects of symmetry (for instance Nordström 1972, 75–7, Pl. 26: Group 5). With the exception of one find, which has

designs on both the exterior and interior surfaces (Pl. 12m), the complex patterns are located on the exterior surface.

Imitation basketry: this design consists of closely spaced impressions that are roughly diamond-shaped in form and up to 3 mm in depth (Pl. 2d). The impressions appear to be arranged in lines running side-by-side and probably covered most of the vessel exterior.

The design may have been intended to represent basket weave. On first inspection this decoration was thought to have been produced by pressing matting onto the vessel exterior to produce a 'basket-impressed' appearance (Tangri 1991b, 141). Subsequent analysis has shown the spacing of impressions to be inconsistent with basket weave and it has been suggested that the design should be characterised as 'imitation basketry' or 'woven mat' (Hope 2002, 45). The latter of these terms seems less appropriate as the design differs slightly to what is identified elsewhere as 'woven mat' (Banks 1980, 304; 1984, 155).

Impressed patterns: two types were recorded in the collection. One type consists of closely spaced square impressions on the exterior surface (Pl. 2e). Although the design arrangement of the impressions cannot be ascertained from the few body sherds that bear this decoration, very similar examples recovered from the Armant region (Mond and Myers 1937, 267, Pl. LXXIV.3.182–93) indicate that the impressions may have covered the whole body.

The other type of impressed pattern consists of rows of roughly square impressions (Pl. 2f). These appear to have been produced using a serrated comb and executed by way of the 'rocker-stamp' or 'simple impression' techniques (Gatto 2002a, 68, Figs 5.2–3). While the exact technique cannot be determined due to the preservation of the sherds, what may be identified is that one sherd bears 'wavy' rows of impressions, and several sherds are only partially decorated, indicating that the design was localised on the vessel. Despite problems in identifying the motif, the design is undoubtedly a product of the broader 'Khartoum-related' tradition that existed in northeast Africa at the time (e.g. Riemer and Jesse 2006; Jesse 2010).

Fingernail incisions: not a particularly complex form of decoration, this design consists of a number of fingernail incisions spaced at relatively even intervals across a lateral plane on the exterior surface of the vessel (Pl. 2g).

Potmark: four connected incisions, forming a 'W' on the interior surface of a vessel (Pls 2h and 15n), are the only evidence for a 'potmark' in the collection. The precision of execution suggests a deliberate application, and this example compares with examples from the Early Dynastic corpus established for the Nile Valley.⁷

2.4 Shape description

Shape cannot be used as a precise indicator of the range of types present in this collection for a few reasons. First, less than half the finds reveal useable information on shape. While it is not uncommon to come across rimsherds, these are often too small or warped to offer reliable information on shape. This is particularly so for material from Masara and Bashendi A sites, the latter of which has yielded only one example of a clearly discernible shape. Secondly, a limited number of shapes have been recorded. With the exception of a few ‘inflected’ examples (below), the majority of vessels have simple contours with rounded bases and restricted or unrestricted orifices. While this is not overly helpful for taxonomic purposes, a few basic shape variations can be plotted temporally, which confirms the need to incorporate shape as an analytical property into the study.

An important distinction to make when dealing with shape is that not all objects in the collection are pots. A number of miscellaneous fired clay objects were recorded which are described separately from the vessels.

2.4.1 Vessel shape

The shape analysis is focussed on the contour and proportion of vessels. Following Shepard (1965, 228–30, Fig. 21) three basic geometric or ‘structural’ classes of vessel shape are represented: *unrestricted* vessels, examples of which have an orifice forming the maximum diameter of the vessel; *restricted* vessels, examples of which have a maximum diameter located on the body of the vessel; and *independent restricted* vessels, which are distinct for having an inflection point situated above the widest point of the vessel. Within each of these classes a number of shape variations occur and these may be identified according to vessel contour.

2.4.2 Vessel contour

Shepard (1965, 228, Fig. 22) identifies four groups of vessel contour: *simple*, *composite*, *inflected* and *complex*. Each of these is defined in relation to the four ‘characteristic points’ of a vessel profile: a) end points, b) points of vertical tangency, c) inflection points, and d) corner points (Shepard 1965, 226). Corner points are not represented in the collection, which removes any composite vessel contours. There are no complex vessel contours either, which rely on combinations of corner points, inflections points and points of vertical tangency (Shepard 1965, Fig. 22). This leaves a collection that comprises only simple and inflected contours.

Returning to the three structural classes of vessel shape, the first of these, the unrestricted class, comprises a number of examples that are separated into three subclasses on the basis of the curvature of vessel wall and the proportions of height and width (Fig. 3). The first subclass comprises simple contours with divergent-convex outlines. The second subclass differs only in

that the outline is divergent-straight, while the third subclass has inflected contours with an alternating divergent-convex/divergent-straight/divergent-concave outline.

The restricted class comprises two subclasses also distinguished by wall curvature and height-width ratios. Subclass 4 has simple contours with divergent-convex/convergent-convex outlines, and the widest point of the vessel above the vessel equator (Fig. 3). The examples from subclass 5 differ only in that the widest point is situated at, or below, the vessel equator.

As for the independent restricted vessels, only inflected contours are recorded for this class. Two subclasses (6 and 7) are distinguished, the first of which is distinct for its divergent-convex/convergent-convex/convergent-concave outline (Fig. 3). The other subclass comprises two examples with outlines that may be described as divergent-convex/convergent-convex/convergent-concave/divergent-concave.

2.4.3 Proportion

Vessel proportion is concerned usually with the maximum height and width of the object. In the case of unrestricted vessels, width (diam.) measurements are taken from the orifice whereas restricted vessels have width measurements taken from the body and orifice. In all cases height is measured from the base of the vessel to its orifice (Shepard 1965, 236–45).

When dealing with a collection of sherds, and not whole vessels, it is acceptable to calculate width from rimsherds or points of curvature on body sherds using a circumference template (Rice 1987, Fig. 7.9). In the current case many of the rimsherds were too small or asymmetrical to provide precise measurements, and the maximum diameter recorded for a number of unrestricted vessels could only be approximated within a range of centimetres. In the case of restricted vessels, the size and symmetry of many body sherds also complicated attempts to determine the maximum diameter, and given the rarity of complete profiles in the collection, height proportions could only be guessed in many cases.

With these restrictions, vessel proportion is discussed in very basic terms. Shallow vessels are those with a height/width ratio of 1:2, medium vessels have a ratio of roughly 1.5:2, and deep vessels have a height/width ratio of >1:1. While there exists considerable variation in size, the following three categories were established to provide a basic indication of size grouping: ‘small’ vessels are those with a maximum orifice width up to 15 cm, ‘medium-sized’ vessels have a maximum orifice width of 16–25 cm, and ‘large’ vessels have a maximum orifice width greater than 25 cm.

2.4.4 Miscellaneous objects

In this sub-category are pottery objects that cannot be classified using the same criteria as above. The list

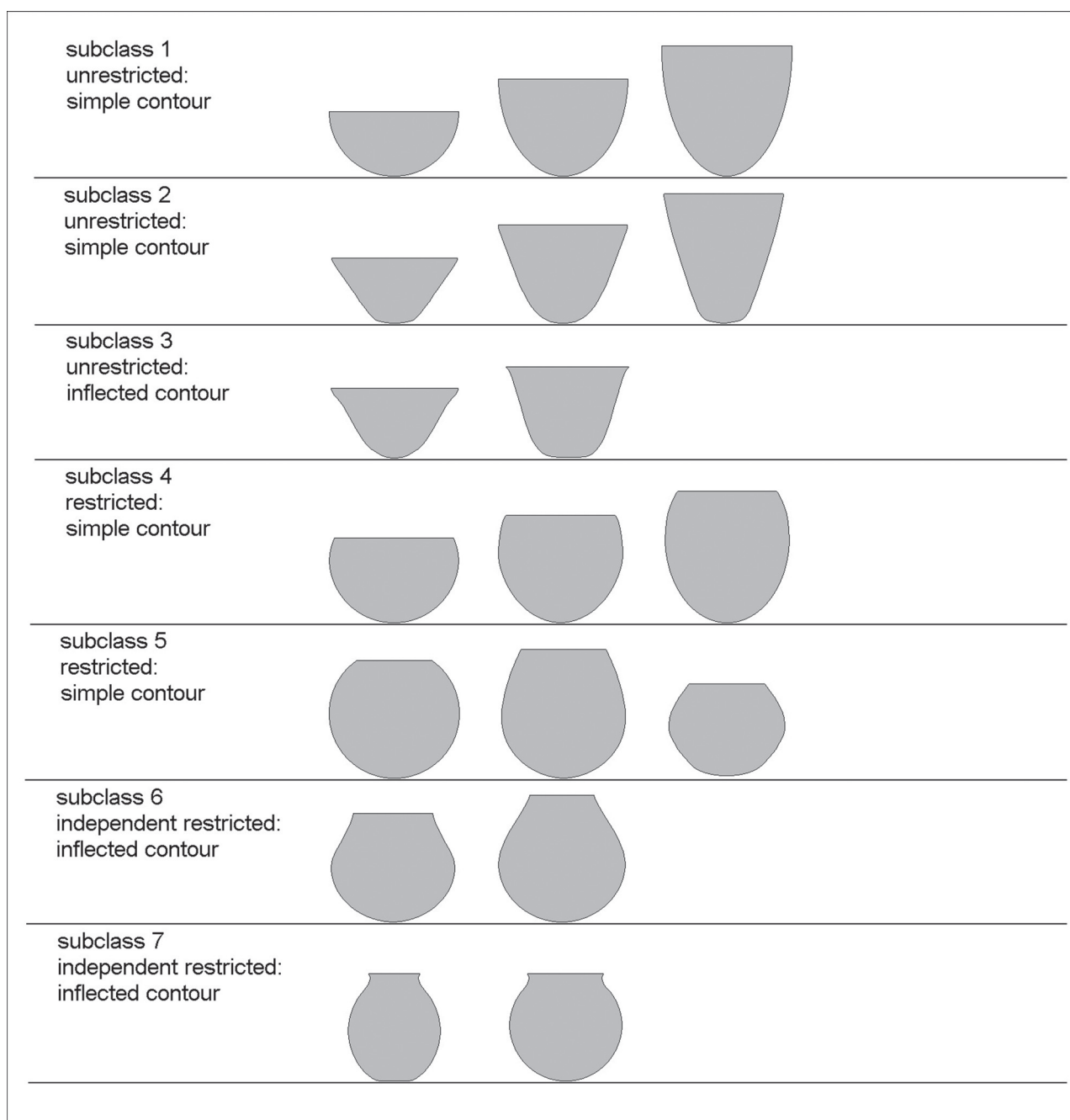


Figure 3. Stylised vessel shapes recorded for the Dakhleh collection.

includes truncated cones, perforated discs, token-shaped objects, spoon-shaped objects and scrapers. The objects in this group are referred to as ‘miscellaneous’ only because they are few in number and do not share the same properties as the vessels.

TRUNCATED CONES

The truncated cone, or ‘Clayton ring’ (Riemer and Kuper 2000; Gatto 2002b), may be described as an open-ended cylinder with walls tapering outward towards one end. The cones range in height between

8.0 and 10.5 cm and the diameter of the smaller orifice is between 8.5 and 11.0 cm while the larger orifice usually has a diameter 2–3 cm larger: examples range between 11.5 and 14.0 cm.

PERFORATED DISCS

Often found in association with the truncated cones are discs with a single perforation located roughly in the centre of the object. Seventeen of these have been found, all of which provide measurements. The largest disc is 14.0 cm in diameter, though all other examples range

between 6.1 and 10.0 cm. The smallest perforation is 0.6 cm in diameter, whereas all other perforations range in diameter between 1.2 and 2.7 cm. All but one of the discs have been worked from body sherds originating from large vessels. The resulting effect is that most discs are slightly convex and have a thickness ranging 6.0–9.0 mm.

TOKEN-SHAPED OBJECTS

Included here are two small pottery finds that have been worked into beads or token-shaped objects. The smaller example measures roughly 13.0 mm in diameter and 4.5 mm in height, whereas the larger is of a similar thickness but has a diameter of 14.5 mm. Evidently they have been worked from vessel body sherds.

SPOON-SHAPED OBJECTS

As the name implies, these objects take the appearance of a spoon or flattened ladle. At least two of these objects have been recorded, and examples appear no greater than 35 mm in height and 70 mm in width. The length of the object is difficult to tell as the proximal end of these objects may have narrowed to form a spout.

SCRAPERS

A handful of sherds appear to have been worked into scrapers. These are usually no more than 60 × 35 mm in surface area and as they were worked from body sherds, the thickness of the objects is typically within the range of 6.0–9.0 mm. The identification as a scraper is based on abrasion marks on the flattened side of the object.

Notes

- 1 Riemer (pers. comm., July 2003) reports that a seed-tempered fabric has been identified among the material collected from mid-Holocene findspots on the plateau above Dakhleh (see also 'Fabric 1' of the NEAPPO system: http://www.uni-koeln.de/sfb389/a/a1/a1_informations_neappo_fabric.htm). Seed, or grain, tempering is reported also among Holocene pottery collections from Nabta Playa (Magid 2001), Eastpans (Gehlen *et al.* 2002, 97) and Abu Minqar (Riemer 2009, 59) – see Fig. 33 for locations.
- 2 Edwards and Hope (1987, 4) suggest that prehistoric pottery could have been fired in a type of 'proto-kiln'. This is defined as a process in which '... pots were placed on a smouldering bed of fuel (e.g. dung), and then more fuel was heaped up over them, thus resulting in a heavy reduction firing atmosphere. A reasonable degree of heat conservation due to the fuel heaped up over the stack of pots would have occurred. As the fuel (dung) finally burnt away the oxygen from the surrounding air would give a pink to red colour to any exposed surfaces of the pots,' [parentheses in original]. Field experiments (Warfe and Jamieson 2006; Warfe forthcoming a) reveal that pottery produced in a

bonfire structure, as opposed to a pit structure, bears a closer resemblance in fired colour to the prehistoric material.

- 3 Hope (1998, 57; 2002) identifies the presence of black-topped pottery in the collection. While it is certain that several finds have blackened rims, care must be taken in using the term 'black-topped' given its usage elsewhere in northeast Africa. Reference is made, of course, to the black-topped wares that define the pottery assemblages of Predynastic Egypt (Petrie and Quibell 1896, 12, Pls XVIII–XXI; Brunton and Caton-Thompson 1928, 21–2, Pls XII–XV) and found elsewhere in the Nile Valley (Arkell and Ucko 1965, 151; Nordström 1972, 45; Gatto 2006, 103–4). In these instances, the ubiquity and temporal isolation of black-topped pottery leaves absolutely no doubt this was an intentional style of pottery making, which is demonstrated also by the neatness and deliberateness of its execution (Hendrickx *et al.* 2000; Baba and Saito 2004). By contrast, the patchiness and unevenness of Dakhleh examples gives the impression that the blackening was an unintended and uncontrolled result of firing vessels on their rims. As well, because the examples are not tied to a particular period or site in the oasis, it is problematic to treat them as a strict 'tradition'. In stating this, it is acknowledged that black-topped pottery is becoming more commonly recognised as a category of desert pottery (e.g. Nelson 2002b, 18; Riemer and Schönfeld 2006, 349–50, Fig. 7; 2010, 739; 754–8; Nelson and Khalifa 2010).
- 4 Mention should be made of the fine striations that are found frequently on vessel surfaces. These can be up to 20 cm in length, are usually very thin (often no more than 1.0 mm in width) and penetrate the surface to a depth of 1.0 mm or more. The striations tend to group in vertical orientation on the exterior surface and in lateral or oblique orientation on the interior surface. Hope (2002, 46) suggests these marks were produced by reeds, though it is perhaps more likely they were produced by sand particles dragged across the surface during the final wiping or smoothing process (pers. observ., through experimentation December 2002). Although the striations effectively roughen the surface, their appearance is not considered a form of 'texturing'.
- 5 The term 'decoration' is used here in the conventional sense and refers to design elements and motifs that are universally considered to be components of decoration – for example, incised lines arranged in a geometric pattern underneath the rim. The reason for drawing this distinction is to steer the discussion away from whether other types of surface appearance such as high compaction, unusual colours, or even deep texturing, could also be considered 'decorative'. Although these qualities may be aesthetically pleasing, this line of inquiry is ultimately dissatisfying as one would need to consider all surface treatments as decorative in some way, blurring lines of intentionality.
- 6 See CerAfim Article 218 'A Technical Redefinition' (<http://lampea.cnrs.fr/cerafim/spip.php?article218>).
- 7 My thanks to Lisa Mawdsley (pers. comm., August 2007) for locating similar examples to this in publications on the site of Tarkhan (Petrie *et al.* 1913, Pl. XXXI.172) and First Dynasty material from Abydos (Petrie 1900, Pl. LIII.859).

Chapter 3

Classification

The pottery properties identified in the previous chapter are grouped here into ‘mutually exclusive categories’ (Adams 1988, 43) to form a classification. The system for classification is a refined version of that started by Colin Hope in 1978 for all pottery finds from DOP concession sites. While some modifications were necessary to account for the growing body of ceramic material recovered from Holocene sites, what follows maintains both the general design and the objectives of the original. In finalising the current system the principal aim was to produce a typology that facilitated time effectiveness in sorting, analysing and recording large quantities of pottery, while being sensitive to variations in the collection that can be mapped temporally.

The classification is a ‘ware-based’ system (Rice 1987, 286–7), involving a combination of fabric and surface treatment. Fabric forms the core criterion for classification as it is always identifiable even with the very small, eroded sherds. As roughly 90 per cent of the finds also retain surface treatment, this property formed the secondary criterion. Shape is not used to define the type as there are several wares for which morphological details cannot be determined. The system was designed to retain adaptability so that any new types recovered through future fieldwork may be integrated.

3.1 Fabric classification

In the following system, fabrics are distinguished principally by the size and quantity of specific non-plastic inclusions and the texture of the groundmass. Secondary factors, such as the colour and zoning of the section and matters relating to technological properties, are also included to provide some indication of the variation among individual fabrics.

A feature of this system is to group fabrics into ‘families’ on the grounds that the constituent members share similar attributes. It is important to emphasise that this is simply a way of organising the data, to collate fabrics with like fabrics. It does not imply that all fabrics in each family are necessarily related (i.e. chronologically and/or spatially). Nine Fabric

Families have been identified and the introductory paragraph for each elucidates the grounds on which the constituent fabrics are distinguished from one another.

Thirty-three fabrics have been identified in this study. While this number may seem high given the size of the collection, it reflects a conscious decision to define the fabric type within relatively strict boundaries. This decision was made in order to draw out subtle differences among the more homogenous fabrics. Although the definitions are somewhat rigid, they still allow for expediency in classifying, while retaining the necessary degrees of consistency and reproducibility.

3.1.1 Fabric Family 1: sand-and-shale

Five fabrics (1A–E) are grouped in this family. The first three (1A–C) are closely related. They are produced from ferruginous clays and comprise the same inclusions – a predominance of sand and shale. They also share a number of technological properties and generally display the same range of fired colours. Distinguishing the individual fabrics is the quantity and particle size of the inclusions as well as the groundmass texture.

Fabric 1A represents the finest version of the typical sand-and-shale combination, whereas Fabric 1C has much coarser inclusions and a more open-bodied texture, making the two easily distinguishable. Fabric 1B lies in between, representing a finer version of the 1C and coarser version of the 1A – because of variations in the size and quantity of inclusions, Fabric 1B is not always easily distinguishable from the finer or coarser variations.

The other two fabrics, 1D and 1E, which also have varying quantities of sand and shale inclusions, are distinguished on account of additional inclusions and/or different technological properties. Fabric 1D comprises considerable quantities of limestone inclusions and has a glassy groundmass, whereas Fabric 1E is denser than Fabrics 1A–C and generally contains less inclusions. In almost all cases, inclusions constitute less than 35 per cent of the fabric matrix.

FABRIC 1A (VERY FINE SAND-AND-SHALE) (Pl. 3a)

Groundmass: closed-bodied to medium-bodied texture. Sections can be unzoned or zoned, usually with thick cores. The fired colours of sections and surfaces are mostly light and include weak reds (10R 4/2–5/4), greyish-browns (10YR 4/2–5/2), yellowish-browns (10YR 4/4–5/6) and reddish-browns (2.5YR 4/3–5/4).

Inclusions: rare to common very fine and fine shale in all colours. Rare to common mostly fine sand in a variety of colours and translucent. Sand particles can be sub-angular, sub-rounded or well rounded. Limestone particles, or decomposed halos, are rare to common and often very fine or fine in size. Examples can also include fine grit particles and the occasional coarse burnt-out vegetal void.

Technological properties: wall thickness generally ranges 3.5–9.0 mm. Fractures are mostly semi-even and shale particles are aligned mostly in parallel orientation to the walls. Surfaces have a low to medium scratch resistance.

FABRIC 1B (FINE SAND-AND-SHALE) (Pl. 3b)

Groundmass: mostly medium-bodied in texture. Examples may be unzoned or zoned, generally with blurred transitions. Fired colours include medium greys (5YR 5/1–6/1), reds (10R 4/6–5/8; 2.5YR 4/6–5/8) and reddish browns (2.5YR 4/3–5/4; 5YR 4/4–5/4).

Inclusions: common fine and medium shale particles appear in all colours though light grey seems to predominate. Few to common sand inclusions are present, mostly sub-angular or sub-rounded, and can range from fine to coarse in size. Few to common fine limestone voids are also notable and rare vegetal voids have been observed in examples.

Technological properties: wall thickness generally ranges 4.0–9.0 mm. Fractures are semi-even, and shale particles appear mostly in parallel orientation to the walls. Surfaces have a low to medium scratch resistance.

FABRIC 1C (COARSE SAND-AND-SHALE) (Pl. 3c)

Groundmass: medium-bodied to open-bodied texture. Sections can be unzoned or zoned, and with the same colours identified for Fabrics 1A and 1B.

Inclusions: few to common shale particles are present. While these are mostly medium in size, fine and coarse particles are also noted. Shale particles are generally black, grey-green or light grey in colour. Medium-textured and coarse sand and fine limestone particles appear in rare to common frequencies.

Technological properties: wall thickness ranges 5.0–11.0 mm. Fractures are semi-even or uneven, and shale particles are aligned either randomly or in parallel orientation to the walls. Surfaces have a low scratch resistance.

FABRIC 1D (FINE SAND-AND-SHALE WITH COMMON LIMESTONE) (Pl. 3d)

Groundmass: closed-bodied to medium-bodied texture. Sections may be zoned with distinct transitions and thin surface margins. Fired colours are dark, with cores and margins either reddish-grey (5YR 4/2) or dark red (10R 4/6). The slightly glassy groundmass gives the impression that this fabric was subjected to higher temperatures in which incipient vitrification occurred.

Inclusions: few very fine shale particles (mostly black) and fine sand particles. Decomposed voids of very fine to coarse limestone particles are common in distribution.

Technological properties: wall thickness generally ranges 4.0–7.5 mm. Fractures are even, and surfaces have a high scratch resistance.

FABRIC 1E (Pl. 3e)

Groundmass: closed-bodied to medium-bodied texture. Sections can be unzoned or zoned with a dark reddish-grey (10R 4/1) core and distinct red (10R 6/6–6/8) margins to match surface colour.

Inclusions: few, fine and medium shale particles may be observed, and fine rounded sand particles are also present; these are mostly yellowish or reddish in colour. Very fine and fine limestone particles are also few to common.

Technological properties: wall thickness generally ranges 5.0–10.0 mm. Fractures are even, and surfaces have a medium scratch resistance. The groundmass and inclusions appear to be locked tightly together, suggesting some effort went into the preparation of this fabric. The groundmass is also slightly glassy, indicative of incipient vitrification.

3.1.2 Fabric Family 2: shale-rich

Fabrics included in this family have shale inclusions in greater quantities than other inclusions – in some cases inclusions appear to constitute more than 50 per cent of the fabric matrix. Four shale-rich fabrics have been identified, the first three of which (2A–C) are distinguished on the grounds of inclusion size (fine, coarse and very coarse). The fourth fabric (2D) has additional inclusions setting it apart from the others.

Fabrics 2B and 2C differ only in the coarseness of shale inclusions. Both are easily identifiable for their mosaic-like surfaces, produced by the coarse size and frequency of shale. Fabric 2A is less easily identifiable as it resembles closely Fabrics 1A and 1B in texture, fired colour and shale inclusions. While Fabric 2A is classified separately, it could be considered a variation of the more generic sand-and-shale fabrics.

FABRIC 2A (FINE SHALE) (Pl. 4a)

Groundmass: closed-bodied to medium-bodied texture. Sections can be unzoned or zoned, usually with blurred transitions. The fired colours include greys (5Y 4/1; 10YR 4/1) and reds (2.5YR 4/6–5/8), and one variant is notably brown (7.5YR 4/4).

Inclusions: the bulk of the shale inclusions are very fine and fine in size, and mostly light grey, black, or olive green in colour. Fine limestone inclusions (or decomposed voids) are present in common frequencies and few fine and medium-textured sand particles are also sometimes present.

Technological properties: wall thickness generally ranges 3.0–6.0 mm. Shale particles are aligned mostly in parallel orientation to the walls and are often packed tightly to the clay. Fractures are semi-even and scratch resistance is low to medium.

FABRIC 2B (COARSE SHALE) (Pl. 4b)

Groundmass: mostly medium-bodied texture though one variant is especially closed-bodied. While zoning occurs with this fabric, the coarseness of the inclusions makes it difficult to distinguish where zones begin or end. Only a few examples exhibit cores with clearly defined margins. Fired colours can be reddish-yellow or strong brown (7.5YR 5/8–6/8), light grey (7.5YR 6/2), medium/dark grey (5Y 4/1) and very dark grey/brown (7.5YR 2.5/3).

Inclusions: shale inclusions are common to frequent in distribution and fine to coarse in size. They are mostly light grey, olive or black in colour. When sand is present in samples it is rare and occasionally grit particles may be observed. Shale particles stick well to the clay to the point that they can be difficult to differentiate from the groundmass.

Technological properties: wall thickness generally ranges 2.5–10.0 mm, fractures are semi-even or uneven and shale inclusions are aligned either randomly or in parallel orientation to the walls. Scratch resistance ranges from low to high.

FABRIC 2C (VERY COARSE SHALE) (Pl. 4c)

Groundmass: closed-bodied to open-bodied texture. Sections tend to display relatively distinct zoning. The cores are typically darker and can be grey (5Y 4/1) or weak/dusky red (2.5YR 3/2–4/2), whereas the respective margins are yellowish-brown (10YR 5/4–4/8) and red (2.5YR 4/8–5/8) to match the surface colours.

Inclusions: light grey, red and black shale inclusions are common to dominant and, while mostly coarse and very coarse in size, extremely coarse particles (>8 mm) are occasionally present. The only other notable inclusion is coarse grit which occurs rarely.

Technological properties: wall thickness generally ranges 4.0–11.0 mm, fractures are uneven and the shale is often in random orientation. Scratch resistance ranges from low to high.

FABRIC 2D (COARSE SHALE, SAND AND GRIT) (Pl. 4d)

Groundmass: medium-bodied to open-bodied texture. The section is zoned with a gradual transition from light grey (2.5Y 7/2) to weak reddish-yellow (5YR 6/6) towards the exterior surface.

Inclusions: fine and medium shale particles are common to frequent in dispersion and mostly light grey in colour. Also present in few frequencies are coarse limestone particles and medium-textured sand particles that are mostly sub-angular.

Technological properties: wall thickness ranges 5.0–9.0 mm, fractures are semi-even, and the shale is aligned either randomly or in parallel orientation to the walls. Scratch resistance is medium.

3.1.3 Fabric Family 3: sand

Six fabrics (3A–F) are grouped in this family on the grounds that each exhibits few inclusions other than sand and all appear to be produced from ferruginous clays. Fabrics 3A–3C are both fine and distinguishable principally on account of the frequency and coarseness of the sand inclusions. Fabric 3D stands out for its particularly coarse sand particles and gritty texture. Fabric 3E is also quite gritty and exceptional in that the presence of small rocks and microfossils are observable, whereas Fabric 3F is slightly silty with few sand inclusions. In all cases, the inclusions form less than 30 per cent of the matrix.

FABRIC 3A (FINE SAND) (Pl. 5a)

Groundmass: closed-bodied to medium-bodied texture. Sections can be unzoned or zoned, becoming darker towards the interior surface. Fired colours are mostly light and include reddish-yellows (5YR 6/8–7/8), yellow (10YR 7/6) and pale olives (5Y 6/3–6/4).

Inclusions: sand particles appear in few to common frequencies and are generally fine or medium-textured. Particles appear in all colours as well as being translucent, and can range in form from rounded to sub-angular. A few grit particles are also present.

Technological properties: wall thickness generally ranges 4.0–8.0 mm, fractures are even or semi-even and scratch resistance is medium to high.

FABRIC 3B (FINE AND MEDIUM SAND) (Pl. 5b)

Groundmass: closed-bodied to medium-bodied texture. The section is zoned with light brown (10YR 5/3) cores and thin red margins to match surface colour.

Inclusions: common inclusions of fine and medium-textured sand. Particles are mostly sub-rounded and appear in all colours. Rare limestone particles are also present.

Technological properties: wall thickness generally ranges 3.5–10.0 mm, fractures are semi-even and scratch resistance is medium.

FABRIC 3C (FINE AND COARSE SAND) (Pl. 5c)

Groundmass: closed-bodied to medium-bodied texture. The transitions from pale brown (10YR 7/3) to light brownish-grey (10YR 6/2) towards the interior surface.

Inclusions: fine and coarse sand particles are present in rare to few frequencies. The coarser particles are sub-rounded and rounded, and can be semi-translucent with a yellowish tinge. The roughly equal spacing of the particles, in addition to their size, gives the impression that coarser particles were an intentional temper. The inclusions impart a slightly gritty feel to the surface.

Technological properties: wall thickness ranges 4.0–6.0 mm, fractures are even, and scratch resistance is low to medium.

FABRIC 3D (COARSE SAND) (Pl. 5d)

Groundmass: medium-bodied to open-bodied texture. The section is unzoned and yellowish-red (5YR 5/6) throughout to match surface colours. The section and surface have a gritty feel and appearance due to the coarse inclusions.

Inclusions: medium-textured and coarse sand particles are present in common frequencies. Particles are mostly sub-angular or sub-rounded and whitish, reddish or orange in colour. Very few fine limestone particles are also present.

Technological properties: wall thickness ranges 5.0–9.0 mm, fractures are semi-even and scratch resistance is medium.

FABRIC 3E (SAND AND GRIT) (Pl. 5e)

Groundmass: closed-bodied to medium-bodied texture. The section is unzoned and brownish-olive (5Y 4/4) in colour.

Inclusions: fine to coarse sand particles are few to common in frequency. Coarse granules, mostly medium grey in colour, appear in few frequencies. These inclusions are tentatively identified as igneous (Eccleston 2002, 63), and impart a gritty feel to the surfaces. Rare fine microfossils have also been observed.

Technological properties: wall thickness ranges 5.5–9.0 mm, fractures are semi-even and scratch resistance is medium to high.

FABRIC 3F (RARE SAND) (Pl. 5f)

Groundmass: closed-bodied to medium-bodied texture. The section is zoned with very dark grey (7.5YR 3/1) inner margin and light brown (7.5YR 6/4) exterior margin, and the groundmass has a notably silty appearance.

Inclusions: very few inclusions appear in this matrix. Included are very fine sand particles and fine vegetal matter in rare frequency. The sand particles are mostly sub-angular and or sub-rounded and appear in most defined colours.

Technological properties: wall thickness ranges 3.5–5.5 mm, fractures are even, and scratch resistance is low to medium.

3.1.4 Fabric Family 4: vegetal

Seven fabrics (4A–G) are grouped in this family. Two main groupings should be highlighted. The first consists of four fabrics (4A–D), each of which has few inclusions other than vegetal matter. The four fabrics are distinguished on account of the coarseness of inclusions: Fabric 4A represents the fine end of the scale, whereas Fabrics 4C and 4D are particularly coarse. The second group, Fabrics 4E–G, comprises significant frequencies of sand in addition vegetal matter. Again, these three fabrics are distinguished on account of the coarseness of inclusions. Inclusions constitute less than 35 per cent of the fabric matrix.

FABRIC 4A (FINE VEGETAL) (Pl. 6a)

Groundmass: closed-bodied to medium-bodied texture. Sections are zoned with very dark grey (Gley1 3/N) and dark grey (5Y 4/1) cores and thin, laminate, reddish-brown (5YR 5/3–5/4) exterior margins to match the surface colour. The reduced interior surface exhibits the same colouration as the core.

Inclusions: few to common vegetal imprints. The imprints indicate that these inclusions were either very fine or fine in size and their elongated form suggests plant stems and casings, not seeds. The inclusions stuck well to the clay as imprints and are well defined. Rare sand particles are also present. Some examples also have extremely fine inclusions (<60 µm) that glint under light and are possibly mica particles.

Technological properties: wall thickness ranges 4.0–7.0 mm. Fractures are semi-even and scratch resistance can be very high (>5.5 Mohs). The voids indicate a random orientation of vegetal inclusions.

FABRIC 4B (MEDIUM-COARSE VEGETAL) (Pl. 6b)

Groundmass: medium-bodied to open-bodied texture. The section is zoned with a black (Gley1 2.5/N) core and

thick, reddish-brown (5YR 5/3–5/4) margins to match the surface colour.

Inclusions: common voids produced by medium and coarse vegetal matter which appear mostly in parallel orientation to the walls. Rare to few fine sand particles are also present.

Technological properties: some vegetal matter is still preserved in the section, suggesting that the firings were of short duration and/or low temperature. Fractures are semi-even, wall thickness generally ranges 6.0–10.0 mm and surfaces have a medium scratch resistance.

FABRIC 4C (COARSE VEGETAL 1) (Pl. 6c)

Groundmass: medium-bodied texture. The section is zoned with a very dark grey core (10YR 3/1) and reddish-brown (2.5YR 4/4) exterior margins to match the surface colour.

Inclusions: common to frequent elongated voids indicate coarse and very coarse vegetal inclusions, probably casings and stems. Fine sand particles are rare or few in distribution, and mica particles are present in some examples.

Technological properties: wall thickness generally ranges 5.0–9.0 mm and voids are aligned mostly in parallel orientation to the walls. Fractures are semi-even and scratch resistance is low to medium.

FABRIC 4D (COARSE VEGETAL 2) (Pl. 6d)

Groundmass: closed-bodied to medium-bodied texture. Section is zoned with exterior margin reddish-brown (5YR 5/3) and gradually transitioning into a red (2.5YR 5/6) interior margin.

Inclusions: common voids indicate the presence of fine, coarse and very coarse vegetal matter. These inclusions stuck well to the clay leaving clear imprints of plant stems and casings. A few fine sand particles are also present.

Technological properties: wall thickness ranges 5.0–11.0 mm, fractures are uneven and surfaces have a medium scratch resistance. The voids are roughly aligned in parallel orientation to the walls. A notable feature of this fabric is the presence of silica skeletons in some voids indicating a low firing temperature.

FABRIC 4E (VEGETAL AND SAND) (Pl. 6e)

Groundmass: medium-bodied to open-bodied texture. Sections can be zoned and appear either reddish-brown (5YR 5/4) or brownish-yellow (2.5Y 7/6; 10YR 6/6) in colour, typically with a darker core.

Inclusions: fine, medium and coarse elongated voids are common and some exhibit clear imprints of plant casings

and stems. Sand inclusions are also present in common frequencies and are mostly fine or medium-textured in size. A few coarse limestone particles are also noted.

Technological properties: wall thickness generally ranges 5.0–10.0 mm. Fractures can be semi-even, and surfaces have a medium scratch resistance. A few samples retain voids with residual carbon marks indicating that firings may not have been of sufficient temperature or duration.

FABRIC 4F (VEGETAL AND COARSE SAND) (Pl. 6f)

Groundmass: medium-bodied to open-bodied texture. Section is zoned with reddish-brown (5YR 5/3) core, and yellowish-red (5YR 5/6–5/8) margins to match the surface colour.

Inclusions: the rare voids that remain from burnt-out vegetal matter indicate uniformly coarse inclusions that appear to be plant off-cuts (casings and stems). A few medium-textured to coarse sand particles are also present.

Technological properties: wall thickness ranges 6.5–11.5 mm. Fractures are semi-even and scratch resistance is low to medium.

FABRIC 4G (GRITTY VEGETAL AND SAND) (Pl. 6g)

Groundmass: medium-bodied texture. Zoning is common with thick black cores and thin reddish-brown (2.5YR 4/4) margins to match surface colours. The glassy appearance of the groundmass suggests incipient vitrification.

Inclusions: a few voids indicate fine, medium-sized and occasionally coarse vegetal inclusions. Sand particles, mostly coarse, are also common. These tend to be sub-rounded in form, translucent and impart a gritty feel. Few limestone inclusions are also present with some examples.

Technological properties: wall thickness generally ranges 6.0–12.0 mm. Fractures are semi-even, and scratch resistance can be very high (>5.5 Mohs).

3.1.5 Fabric Family 5: fine sand and limestone

Two fabrics belong to this family. Both have a fairly homogenous groundmass with few inclusions, and share a number of technical similarities suggesting a close relationship. They are distinguished from one another according to the presence/absence of vegetal inclusions.

FABRIC 5A (FINE SAND AND LIMESTONE) (Pl. 7a)

Groundmass: closed-bodied texture. Sections are unzoned or zoned with thin margins. The core is greyish-brown (2.5Y 4/2; 10YR 4/2), and margins reddish-yellow (5YR 4/6–5/6) to match the surface colour, or greyish-brown (2.5Y 5/2) in instances where the interior surface appears to be reduced.

Inclusions: fine, medium-textured and coarse sand particles appear in rare to common frequencies. These are mostly translucent and sub-rounded or rounded in shape. The only other inclusions are limestone particles that appear in few to common frequencies and are mostly fine to medium in size though occasionally particles can be very coarse. These particles appear on the surface, rendering a speckled appearance to an otherwise homogenous surface.

Technological properties: wall thickness generally ranges 3.0–6.0 mm, fractures are even and the scratch resistance is medium.

FABRIC 5B (FINE SAND, LIMESTONE AND VEGETAL) (Pl. 7b)

Groundmass: closed-bodied texture with an olive-grey (5Y 4/2–5/2) section. Exterior surfaces can be pale olive (5Y 5/4–6/4), while the interior surfaces are reddish-yellow (7.5YR 6/6) or greyish-brown (10YR 5/2).

Inclusions: mostly fine, rounded, translucent sand appears in rare to few frequencies. Coarse limestone particles are rare, and carbon deposits from fine to coarse burnt-out vegetal inclusions are few to common in distribution: the preservation of the deposits indicate rounded and elongate vegetal inclusions.

Technological properties: walls thickness generally ranges 4.0–5.5 mm. Fractures are even and scratch resistance is medium to high.

3.1.6 Fabric Family 6: gypsum

Two gypsum-tempered fabrics belong to this family. They differ in the coarseness of the gypsum inclusions and in the distribution of vegetal inclusions. Inclusions do not exceed 30 per cent of the matrix for either fabric.

FABRIC 6A (FINE GYPSUM) (Pl. 7c)

Groundmass: medium-bodied texture. Sections are dark grey/black (7.5YR 2.5/1–3/1) and unzoned. Surface colour is dark yellowish-brown (10YR 4/4), and the inclusions render a speckled appearance.

Inclusions: fine, medium-sized and sometimes coarse gypsum particles are few to common in distribution. Few, fine to coarse sand particles (mostly sub-rounded) are also present, and rod-shaped vegetal voids are rare and generally medium in size.

Technological properties: wall thickness is usually in the range of 4.0–6.5 mm, though examples can be very thin at 2.3 mm. Fractures are semi-even and scratch resistance is medium.

FABRIC 6B (COARSE GYPSUM AND VEGETAL) (Pl. 7d)

Groundmass: medium-bodied texture. Sections are zoned with dark grey (7.5YR 3/1) core and reddish-brown

margins (2.5YR 4/4) to match surface colour. As with Fabric 6A, surfaces have a speckled appearance.

Inclusions: mostly coarse angular gypsum particles in few to common frequencies and few to common vegetal voids. The voids indicate elongated inclusions (chaff) of coarse size aligned mostly in parallel orientation to the walls.

Technological properties: wall thickness generally ranges 6.5–9.5 mm. Fractures are semi-even, and scratch resistance is medium.

3.1.7 Fabric Family 7: clay aggregates

The three fabrics that belong to this family (7A–C) share the presence of clay aggregates in the matrix, which sets them apart from other fabrics in the collection. They are distinguished from each other partly on account of the section colour.

FABRIC 7A (RED FIRED) (Pl. 7e)

Groundmass: medium-bodied texture. Zoning occurs with red (2.5YR 5/6–5/8) margins to match surface colour and a slightly browner core.

Inclusions: light grey clay aggregates are present in few frequencies. These appear to be closed-bodied aggregates with very fine sand inclusions. Fine limestone particles and sand particles are also present in the matrix in rare to few frequencies.

Technological properties: wall thickness generally ranges 5.0–10.5 mm, fractures are semi-even and surfaces have a low scratch resistance.

FABRIC 7B (BLACK FIRED) (Pl. 7f)

Groundmass: closed-bodied to medium-bodied texture. Thick black cores with thin, distinct red (10R 5/6–5/8) margins to match surface colour, or dark grey (5YR 4/1) cores becoming lighter towards the surfaces.

Inclusions: a few sand particles are present and fine lath-like inclusions appear in rare frequencies: these are similar in colour and shape to shale inclusions though they appear to blend into the clay body. Few coarse clay aggregates are present and share the same texture as the groundmass but comprise greater frequencies of sand inclusions. The aggregates can be strong red (2.5YR 5/6) and light grey to contrast with the dark sections.

Technological properties: wall thickness generally ranges 4.0–10.0 mm. Fractures are semi-even, and scratch resistance is medium to high. The fusing of inclusions and clay body give the impression of incipient vitrification.

FABRIC 7C (GREY FIRED) (Pl. 7g)

Groundmass: medium-bodied texture. Sections are zoned with a medium grey (10R 6/1) or light-grey (5YR 5/1–6/1)

core and very distinct thin red (2.5YR 4/6) exterior margins to match the exterior surface colour.

Inclusions: coarse clay aggregates appear commonly and are slightly more open-bodied than the groundmass and tend to be a lighter or darker grey in colour. Other inclusions are fine and medium-textured sand particles, very fine shale and fine decomposed limestone halos in rare to common frequencies.

Technological properties: wall thickness generally ranges 5.0–11.0 mm. Fractures are semi-even and scratch resistance is medium to high.

3.1.8 Fabric Family 8: marls

Only one fabric has been allotted to this family. Comparisons with Nordström and Bourriau (1993, 176, Pl. IVc) suggest it could be a Marl A1 fabric, deriving from the Nile Valley.

FABRIC 8A (MARL) (Pl. 8a)

Groundmass: closed-bodied texture. Sections can be unzoned or zoned, with a distinct core separating the margins. Colours are all dusky, be they red (2.5YR 5/6), reddish-yellow (5YR 7/8) or yellowish-red (5YR 5/6). Cores tend to be redder whereas margins are more yellowish-red.

Inclusions: very fine sand particles are present in rare frequencies. These are sub-angular and sub-rounded and mostly reddish or translucent. A few very fine limestone particles are present, and so too are voids indicating the presence of fine vegetal inclusions. A few extremely fine inclusions (<60 µm) that glint under light (mica?) are also present.

Technological properties: wall thickness generally ranges 4.5–9.5 mm, fractures are even and scratch resistance is medium to high.

3.1.9 Fabric Family 9: densely textured

Three fabrics are identified in this family, which are very dense in texture. The fabrics share the same inclusions and are separated on the grounds of fired colour. Fabrics 9A and 9C are very similar while Fabric 9B stands out more in colouration.

FABRIC 9A (RED FIRED) (Pl. 8b)

Groundmass: closed-bodied texture. Section is zoned displaying a number of colours that differ to the reddish-yellow (5YR 6/6) surface colour. Section colours include reddish-brown (5YR 4/3–4/4), and olive (5Y 6/3), both slightly darker than the surface colours.

Inclusions: very fine sand particles are present in few to common frequencies. These are opaque and translucent

in appearance and angular, sub-angular and sub-rounded in form. A few slender voids are notable, probably from vegetal inclusions. A few extremely fine inclusions with reflective properties are present – these are similar in size and dispersion to those noted in Fabric 8A and might also be mica fragments.

Technological properties: wall thickness generally ranges 5.5–7.5 mm. Fractures are even, and scratch resistance is medium. The apparent vegetal voids are aligned mostly in parallel orientation to the walls.

FABRIC 9B (PURPLISH-RED) (Pl. 8c)

Groundmass: closed-bodied texture. Section is zoned with a distinct purplish-red (2.5YR 4/2) core and reddish-brown (10R 4/6–4/8) margins.

Inclusions: some rare fine to coarse angular limestone inclusions are present and so too are a few slender voids. As with the Fabric 9A, these probably derive from vegetal inclusion as some carbon patches can be observed. Fine translucent sand particles are rare as are mica particles.

Technological properties: wall thickness generally ranges 3.5–5.5 mm. Fractures are even, and scratch resistance is high.

FABRIC 9C (BROWN FIRED) (Pl. 8d)

Groundmass: closed-bodied texture. The section is zoned with a yellowish-brown (10YR 4/4) core becoming lighter and redder towards the surfaces.

Inclusions: few fine and mostly translucent sand particles. Very few fine limestone inclusions may also be noted, along with mica particles, and rare fine pseudomorphs.

Technological properties: wall thickness generally ranges 7.5–10.0 mm. Fractures are semi-even, and scratch resistance is medium to high.

3.2 Ware classification

A total of 80 wares have been identified through matching the 33 fabrics with the surface treatments. Some wares are recorded only once and represent minor deviations from the main trends, while others appear to be imports. Absolute frequencies for individual wares are presented in Chapter 4 in relation to cultural units.

There are nine ware groups altogether, each defined by surface treatment (plain, compacted, coated, textured and decorated), or a combination of surface treatments (compacted-and-coated, compacted-and-textured, compacted-and-decorated and textured-and-decorated). It is important to emphasise that individual wares within each group are not necessarily related beyond sharing the same surface treatment, and that vessels belonging to a single ware can differ considerably in size, shape, wall

thickness and fired colours, even if they share the same fabric and surface treatment combination.

A coding system has been devised to recognise each ware individually. Using the example ‘Hx3’, the system may be explained as follows. To distinguish handmade (prehistoric) pottery from wheel-made (historic) pottery in the Dakhleh system, an ‘H’ is prefixed to the ware name. This is followed by a letter, or combination of two letters, referring to the surface treatment: ‘x’ is used for ‘textured’ wares. Following this is a number, 3, that refers to one of the fabrics listed above – in this case Fabric 1C. Importantly, the fabric code has no bearing

on the ware code. For instance, ‘Hx3’ and ‘Hx4’ are used for textured versions of Fabrics 1C and 3A, respectively. This information is summarised in the ware classification matrix (Table 5), and following that are general details on each ware group.

3.2.1 Plain (*Hp*) wares

Twenty-eight plain wares (Hp1–28) have been identified in the collection. This number far exceeds any other ware group and the ubiquity of the plain surface treatment makes it difficult to generalise about these examples. Some are particularly well made with thin walls and

Table 5. Ware classification: fabric and surface treatment matrix

	Surface treatment								
	<i>P</i>	<i>M</i>	<i>C</i>	<i>X</i>	<i>D</i>	<i>MC</i>	<i>MX</i>	<i>MD</i>	<i>XD</i>
<i>Fabric</i>	1A	Hp1	Hm1	Hc1	Hx1	Hd1	Hmc1	Hmx1	Hmd1
	1B	Hp2	Hm2	Hc2	Hx2	Hd2		Hmd2	Hxd1
	1C	Hp3	Hm3		Hx3				
	1D	Hp4	Hm4	Hc3					
	1E	Hp5		Hc4					
	2A	Hp6	Hm5		Hd3			Hmd3	
	2B	Hp7	Hm6						
	2C	Hp8	Hm7				Hmx2		
	2D	Hp9							
	3A	Hp10	Hm8		Hx4	Hmc2			
	3B			Hc5					
	3C	Hp11							
	3D				Hd4				
	3E	Hp12							
	3F	Hp13							
	4A	Hp14	Hm9	Hc6		Hd5		Hmd4	
	4B	Hp15							
	4C	Hp16		Hc7					
	4D					Hmc3			
	4E	Hp17						Hmd5	
	4F	Hp18							
	4G				Hx5	Hd6			
	5A	Hp19							
	5B	Hp20	Hm10	Hc8		Hmc4			
	6A	Hp21							
	6B	Hp22							
	7A	Hp23	Hm11		Hx6	Hd7			
	7B	Hp24	Hm12		Hx7				
	7C	Hp25	Hm13		Hx8				
	8A	Hp26		Hc9					
	9A	Hp27		Hc10					
	9B				Hd8				
	9C	Hp28		Hc11					

almost perfectly symmetrical bodies while others are large and clunky; others still, fall somewhere in between. These descriptions are not necessarily specific to individual wares. Taking the Hp1 ware, for instance, some examples are especially fine whereas others appear crudely made with undulating rims, walls of uneven thickness, and a distinct lack of symmetry in the vessel form.

3.2.2 *Compacted (Hm) wares*

Thirteen compacted wares have been identified in the collection (Hm1–13), and most of these are associated with the dominant fabrics produced in the oasis (Fabrics 1A–B, 2B–C). Generally speaking, the compacted wares tend to be thin-walled with even surfaces and symmetrical shapes. Most examples demonstrate a level of care invested in the production of the vessel, and the compacted surface may be an extension of this investment.

3.2.3 *Coated (Hc) wares*

Examples of the coloured slip are uncommon in the collection with several coated wares recorded only once (Hc3, Hc4, Hc6, Hc10 and Hc11).

3.2.4 *Textured (Hx) wares*

The eight textured wares (Hx1–8) are interesting in that most examples relate to two fabric groups, Fabrics 1A–C and 7A–C. Textured wares give the impression of hasty construction, and the irregularity of the surface is matched by irregularities in symmetry and evenness of walls and rims.

3.2.5 *Decorated (Hd) wares*

Eight decorated wares have been identified in the collection, some of which are especially uncommon with only a few examples or single examples found. The Hd4, Hd6 and Hd8 wares are very rare and the fabrics (3D, 4G and 9B) and decorative motifs (impressed patterns and fingernail incisions) suggest these are most likely imports (section 6.1). The Hd1–3 wares, by contrast, are

most likely to be local products as these are associated with common fabrics (1A, 1B and 2A). They also tend to be well made and share similar decorative motifs such as rim-top incisions and complex patterns.

3.2.6 *Compacted-and-coated (Hmc) wares*

With the exception of the Hmc2 ware, which is recorded twice, other examples in this group (Hmc1, Hmc3 and Hmc4) are one-offs. Although these examples share the same surface treatment, the different fabrics and vessel morphologies suggest they are not closely related.

3.2.7 *Compacted-and-textured (Hmx) wares*

Two compacted-and-textured wares (Hmx1–2) have been recorded. These demonstrate an unusual hybrid in the collection, as compacted wares tend to represent finely made pottery whereas textured wares often appear crudely made. The compacted-and-textured combination was not commonly applied, as evidenced by the rarity of the Hmx1 and Hmx2 examples.

3.2.8 *Compacted-and-decorated (Hmd) wares*

Five compacted-and-decorated wares (Hmd1–5) have been recorded in the collection. Three of these wares (Hmd1–3) are associated with Fabrics 1A, 1B and 2A and are closely associated with the decorated and compacted versions of these fabrics (Hd1–3 and Hm1–2, Hm5). The Hmd4 ware is produced from Fabric 4A, which is also associated with compacted (Hm9) and decorated (Hd5) wares. The Hmd5 ware is the exception in this group and most likely represents an import to the collection.

3.2.9 *Textured-and-decorated (Hxd) wares*

This ware group is represented by one example (Hxd1). The rim-top decoration is among the more common motifs in the collection, though it is unique to find this on a textured vessel. As with the compacted-and-textured examples, the Hxd1 represents a rare blend of two distinct surface treatments.

Chapter 4

Quantitative analysis

The analysis of the mid-Holocene ceramic traditions proceeds on the assumption that pottery changes over time in its formal properties, frequency and relational associations with other artefacts (e.g. Petrie 1899). It is therefore expected that particular fabrics, surface treatments and shapes produced by the earlier oasis inhabitants differ from those produced by later inhabitants. As the Sheikh Muftah occupation follows shortly after the Bashendi occupation, *c.* 3800 cal. BC (McDonald 2002a), there is also the expectation that certain ceramic trends will overlap cultural boundaries.

These assumptions have already been tested, to varying degrees, in a few publications (Tangri 1992; Hope 1998; 2002; Warfe 2003b; 2006), which have gone some way in characterising the material for each of the cultural units – the most detailed being Hope's (2002) paper. Building on previous findings, the following analysis offers a quantification of the ceramic material that draws on a larger body of data, and applies cross-tabulations of different properties (e.g. fabric with surface treatment), to gauge the frequencies of combined pottery attributes.

4.1 Methods of analysis

The fabric, surface treatment, shape and ware groups identified in Chapters 2 and 3 form the basic analytical units for investigation, while observations on vessel frequencies, wall thickness and general appearance are used for additional interpretation. The data have been ordered according to site for which a full list is presented in the appendix. This was the most logical organisation as a number of sites are securely associated with one of the three cultural units, and thus the data are already configured to a rough chronological arrangement.

For quantification purposes the data are treated as complete objects, despite the fact that very few complete objects have been recovered. Approximating the number of vessels and miscellaneous objects was relatively straightforward for sites that yielded a small quantity of material. Usually, similarities and differences in the fabric,

surface treatment and shape of individual sherds were sufficient to determine the number of vessels represented by the site collection with a degree of confidence. In the case of localities 136 and 404, which yielded several thousand sherds, two counts were performed. The first was focussed principally on the material recovered from each square within the site grid: while the more significant rimsherds and body sherds from Loc. 404 were analysed, most of the sherds from Loc. 136 were examined, in some cases weight measurements were taken and attempts at vessel reconstructions were also undertaken, though these had limited application given the general lack of standardisation in vessel size and form. The material from neighbouring squares was compared to eliminate cases of doubling-up – i.e. instances where sherds from a single vessel entered the count more than once. This process was repeated and the total count was refined further after a number of additional cases of doubling-up were observed.

It is acknowledged that a margin of error is inherent to this method of counting, as there is with site collection strategies,¹ and there remains the possibility for overestimating and/or underestimating the true number of vessels discarded on site. Although this is recognised as a methodological limitation in achieving precise counts, it should not affect the general patterns determined from the data revealed throughout this chapter.

After collating the vessels according to site (see appendix), standard counts were performed to observe the presence/absence of particular fabrics, surface treatments and shapes for each unit. It was quickly realised that these counts were inadequate in patterning the data and a more complex method of analysis was sought in the form of non-metric multidimensional scaling (MDSCAL). Like most multivariate analyses, this is a powerful tool for identifying patterns in complex data. It was chosen over other programs (e.g. cluster analysis) primarily because the results are presented visually in a clear and understandable format (Figs 4–7). The MDSCAL was

used to grade the relationships between sites based on the ceramic data.² The objective was to see whether sites from the same unit cluster together, in which case the pottery would be exhibiting temporal trends. This objective also helps in identifying anomalies in the collection (e.g. imports) and in tying down sites that are not securely assigned to a sub-unit, which is particularly useful in the case of Bashendi and Sheikh Muftah sites.

Despite its merits, the use of MDSCAL for seriating early Egyptian pottery is limited to only a few applications (Kemp 1982; Hassan and Matson 1989). This may be due to the time-consuming nature of the analysis (Orton 2000, 592), or the fact that MDSCAL is more commonly used for observing spatial distances between sites (e.g. Cherry 1977). Although the data were examined for this purpose as well, with the view to identifying intra-regional trends relating to the use of specific fabrics or surface treatments, no discernible patterns were revealed.

4.2 Analysis using multidimensional scaling and similarity percentage

The data were run through a program called Primer5.³ All 96 sites and five findspots listed in the appendix were included and divided into eight factor groups: Masara (ms), Bashendi A (bsa), Bashendi B (bsb), Bashendi (bs), Early Sheikh Muftah (esm), Late Sheikh Muftah (lsm), findspots (fs), and the last category (hp) is reserved for four sites that have yielded 'handmade pottery' but are not indexed as early or mid-Holocene sites (Churher 1999a). The reason for multiple Bashendi and Sheikh Muftah groups is explained below.

The similarity matrices used for the MDSCAL were generated first by transforming the data to a 'presence/absence' state. This is the strongest transformation possible and used to accommodate inherent disparities in the data (Quinn and Keough 2002, 64–7): in the current case, these would include the different numbers of sites belonging to each factor group, the dominance of a particular fabric/surface treatment/shape on individual sites, and the different sampling strategies used for recovering pottery on a site-by-site basis. The Bray-Curtis similarity measure was then applied to the data to develop a pairwise similarity matrix. This is an appropriate measure when dealing with large quantities of zeroes, produced by data that are absent from sites, by emphasising the data that are actually present (Quinn and Keough 2002, 413).

In total, four series of MDSCAL analyses were run, the first of which treated fabric as the variable. The scattergram produced from this analysis (Fig. 4a–b)⁴ represents the fourth reduction of the data. The three initial attempts were deemed unacceptable as the majority of sites were forced into a tight cluster as a result of six outliers (Locs 064, 076, 103, 210, 270 and 275). Although these outliers form a pattern indicating that the fabrics on Locs 064, 076, 103, 210, 270 and 275 are unusual, it was felt that more instructive patterns might exist within the main cluster. To

test this, the outliers were removed and the analysis re-run. This is considered an acceptable method of dealing with anomalous data (Quinn and Keough 2002, 419) and the results revealed some interesting patterns.

Sites belonging to the 'ms', 'hp' and 'fs' factor groups are spread across the scattergram (Fig. 4a–b) forming no discernible clusters. This indicates little consistency in the fabrics recovered from these sites. While sites belonging to the Sheikh Muftah ('esm' and 'lsm') factor groups are also widely distributed, it is possible to make out a cluster in the middle of the scattergram (Fig. 4a–b). This is significant as it indicates a similar range of fabrics is present on these sites. As for the Bashendi sites ('bsa', 'bsb' and 'bs' factor groups), these are mostly found in the top half of the scattergram. Although the spread of the Bashendi sites is relatively loose, they are still broadly grouped, which again points to similarities in fabrics. Another important pattern to observe is the relative placement of Bashendi and Sheikh Muftah sites. The scattergram has been deliberately oriented to highlight the arrangement of sites in a way that roughly conforms to the known chronological arrangement of units with Bashendi A sites towards the top, below which sit the bulk of other Bashendi ('bsb' and 'bs') sites, followed by Sheikh Muftah sites. Although the placement of Early Sheikh Muftah sites is lower than expected, the overall pattern identified here indicates that temporal trends exist in the fabric data.

The second MDSCAL was run on surface treatment data. Localities 088, 169, 250, 261, 270, 276 and FS5 were automatically excluded as the pottery from these sites does not preserve surface treatment. The scattergram produced from this analysis (Fig. 5a–b) represents the first reduction of the data. A clear pattern is immediately observable in the grouping of Bashendi A, Bashendi B, Early Sheikh Muftah and Late Sheikh Muftah sites. The arrangement of these groups also conforms to the expected chronological relationships. The fact that so many sites are superimposed directly on one another (Fig. 5a–b), which gives the impression of far fewer sites than the fabric analysis, is due partly to the limited number of variables in the surface treatment classification. Even so, strong patterns exist in the surface treatment data that point to meaningful differences in the collection.

The third MDSCAL was performed on shape data. The results (Fig. 6a–b) represent the first reduction of data. It was always questionable whether such an analysis would be worthwhile due to the dearth of shape determinations. Almost half the sites listed in the appendix were excluded from the analysis including all Bashendi A sites and all but one of the Masara sites. The scattergram (Fig. 6a–b) reveals no clear patterns in shape data with the exception of Bashendi sites grouping in the top half. This hints at a very broad pattern in vessel morphology, which is discussed later in this chapter and in section 5.3.

The final MDSCAL was run on ware data. It was important to see whether the strong patterns exhibited with

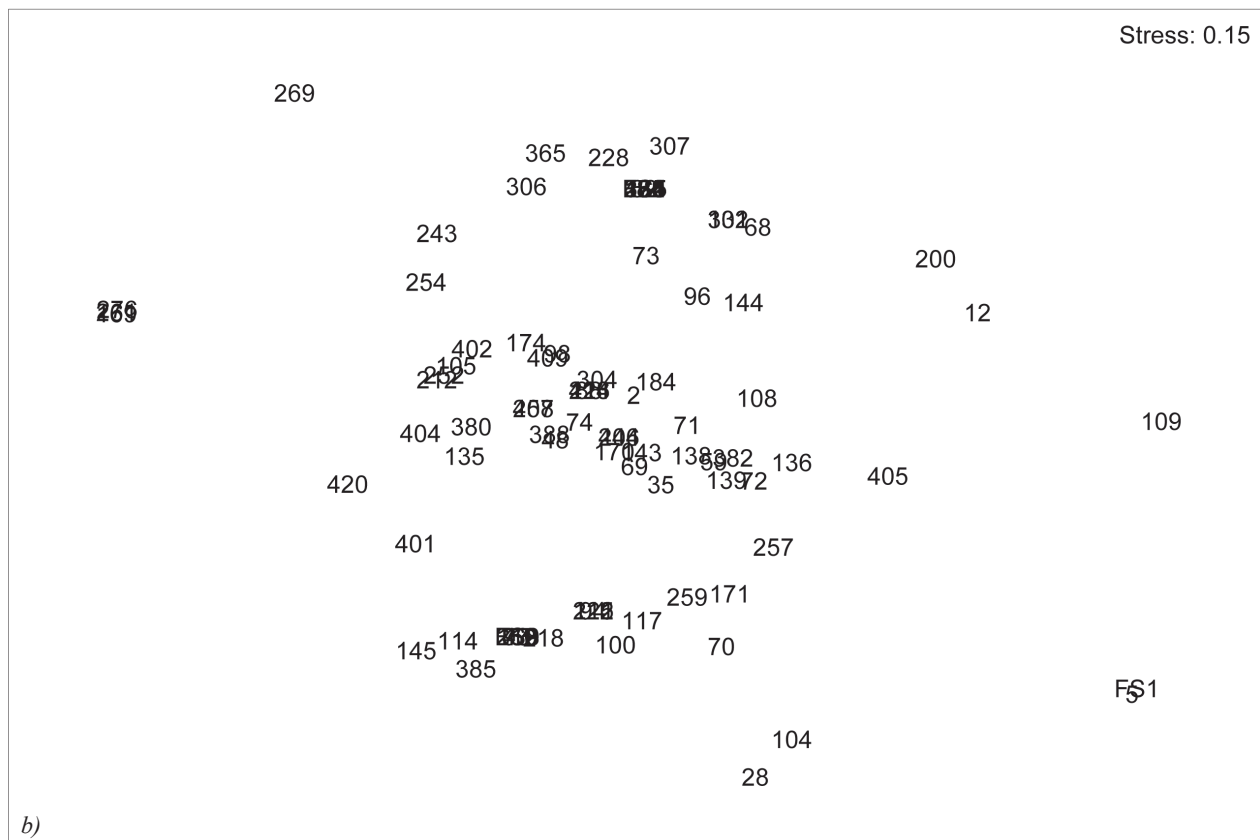


Figure 4. a) MDSCAL scattergram based on fabric data (arranged by sub-unit); b) MDSCAL scattergram based on fabric data (arranged by site no.).

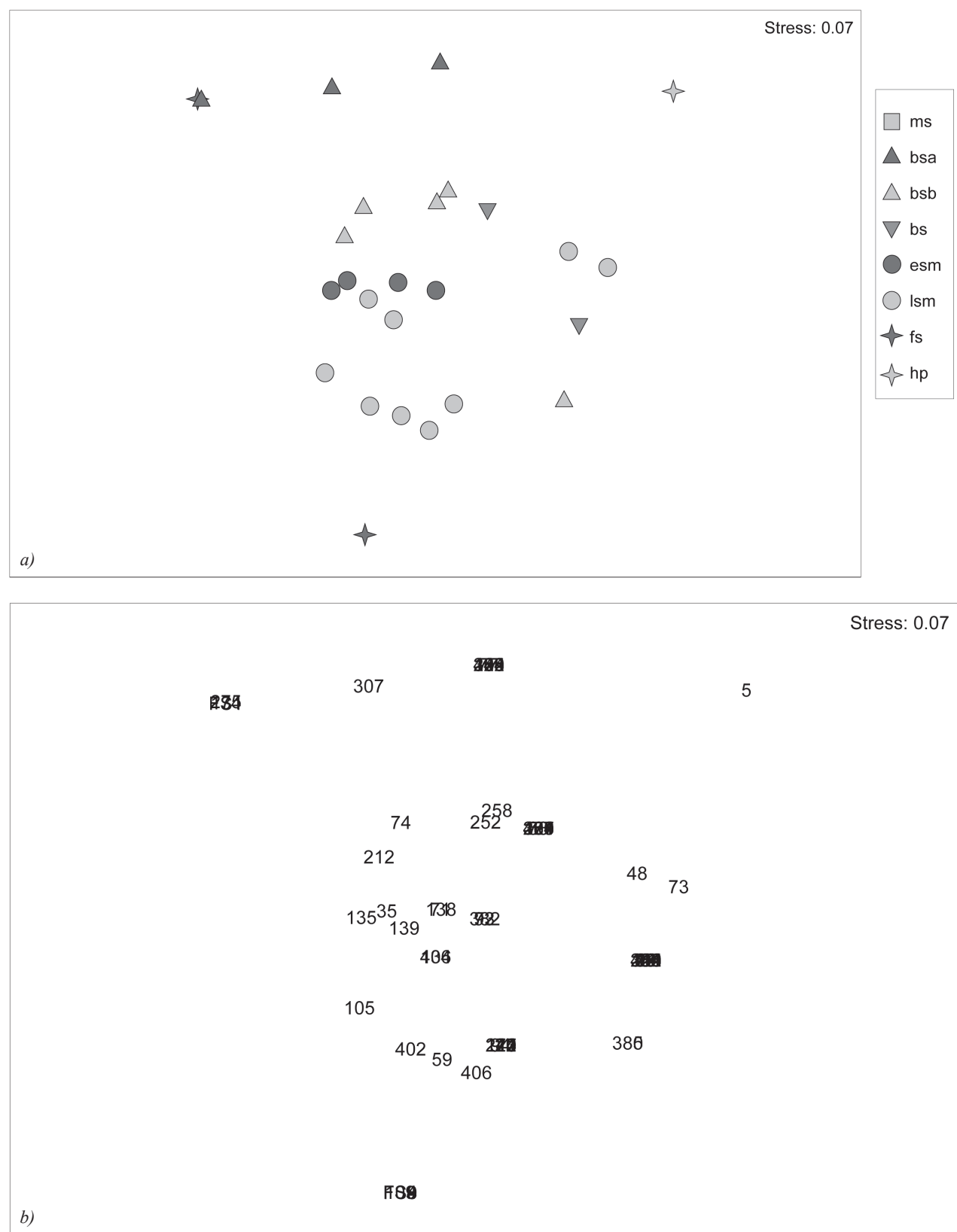


Figure 5. a) MDSCAL scattergram based on surface treatment data (arranged by sub-unit); b) MDSCAL scattergram based on surface treatment data (arranged by site no.).

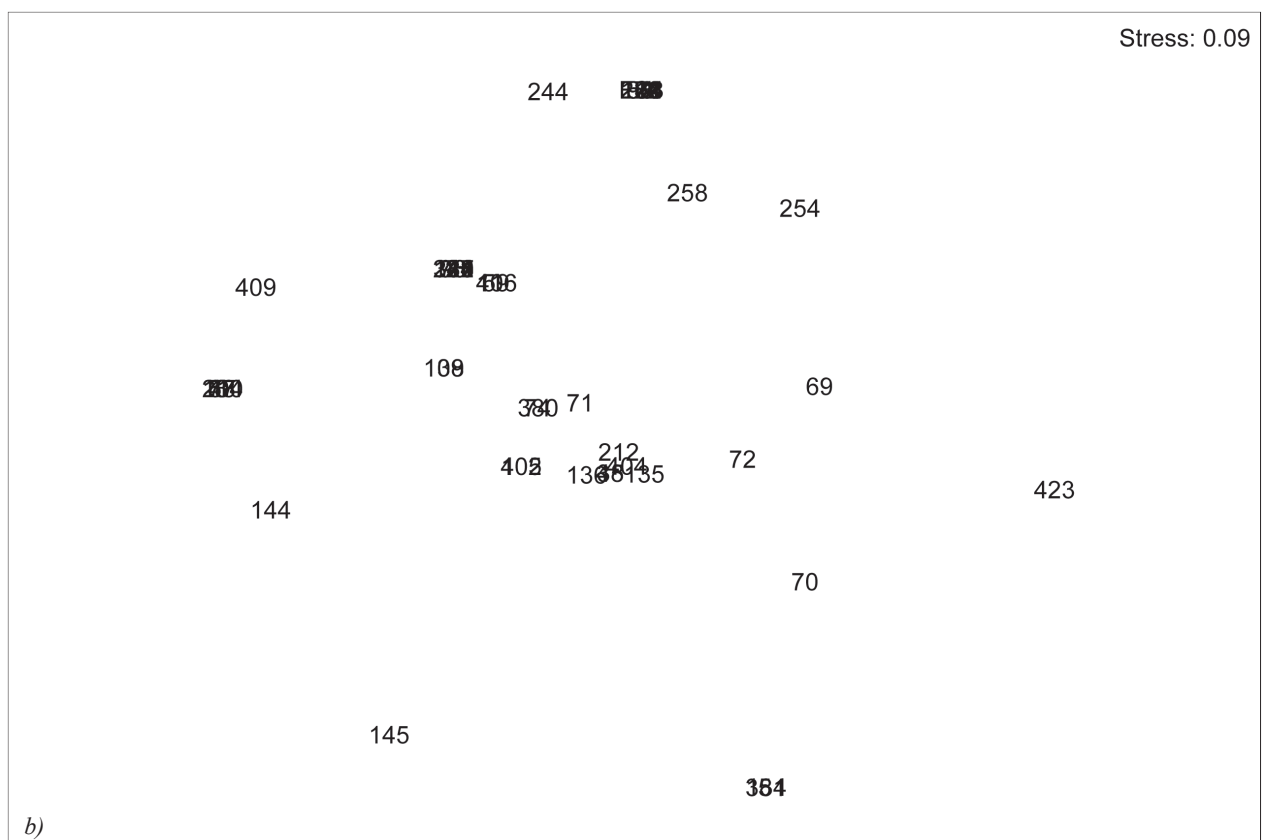
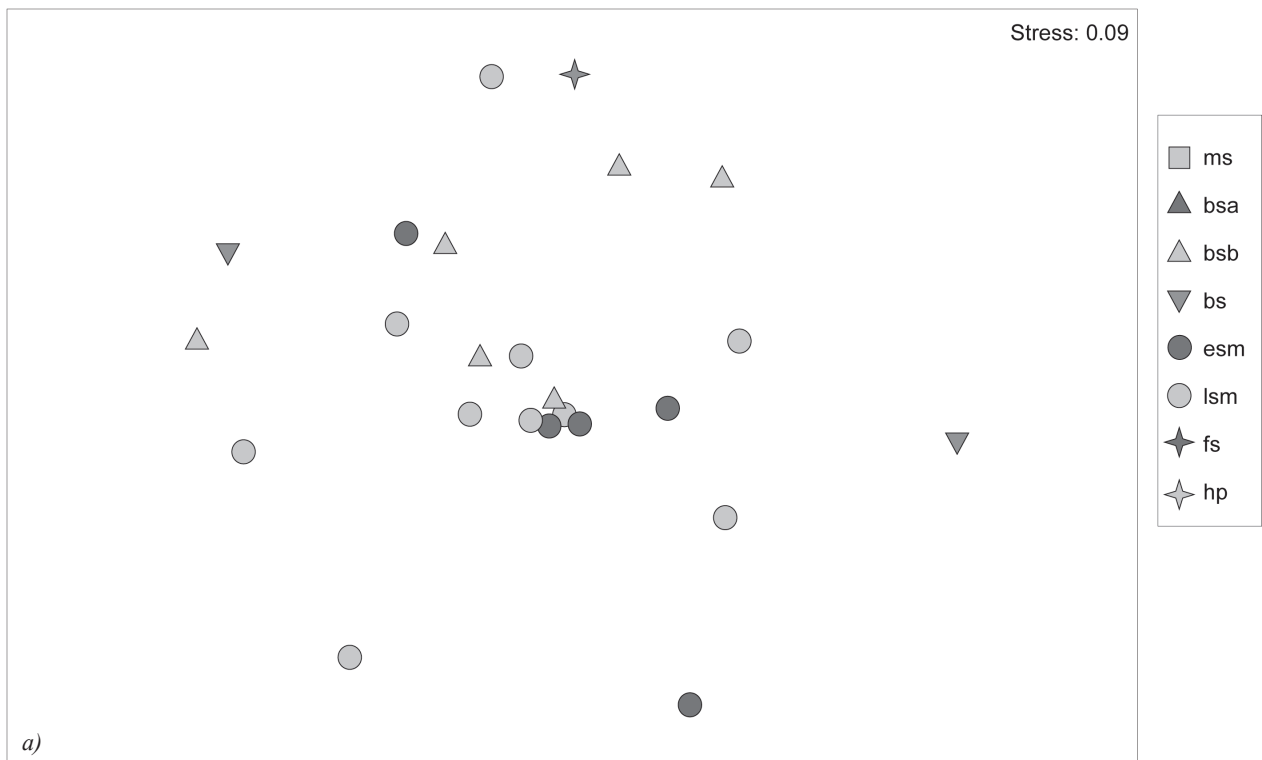


Figure 6. a) MDSCAL scattergram based on shape data (arranged by sub-unit); b) MDSCAL scattergram based on shape data (arranged by site no.).

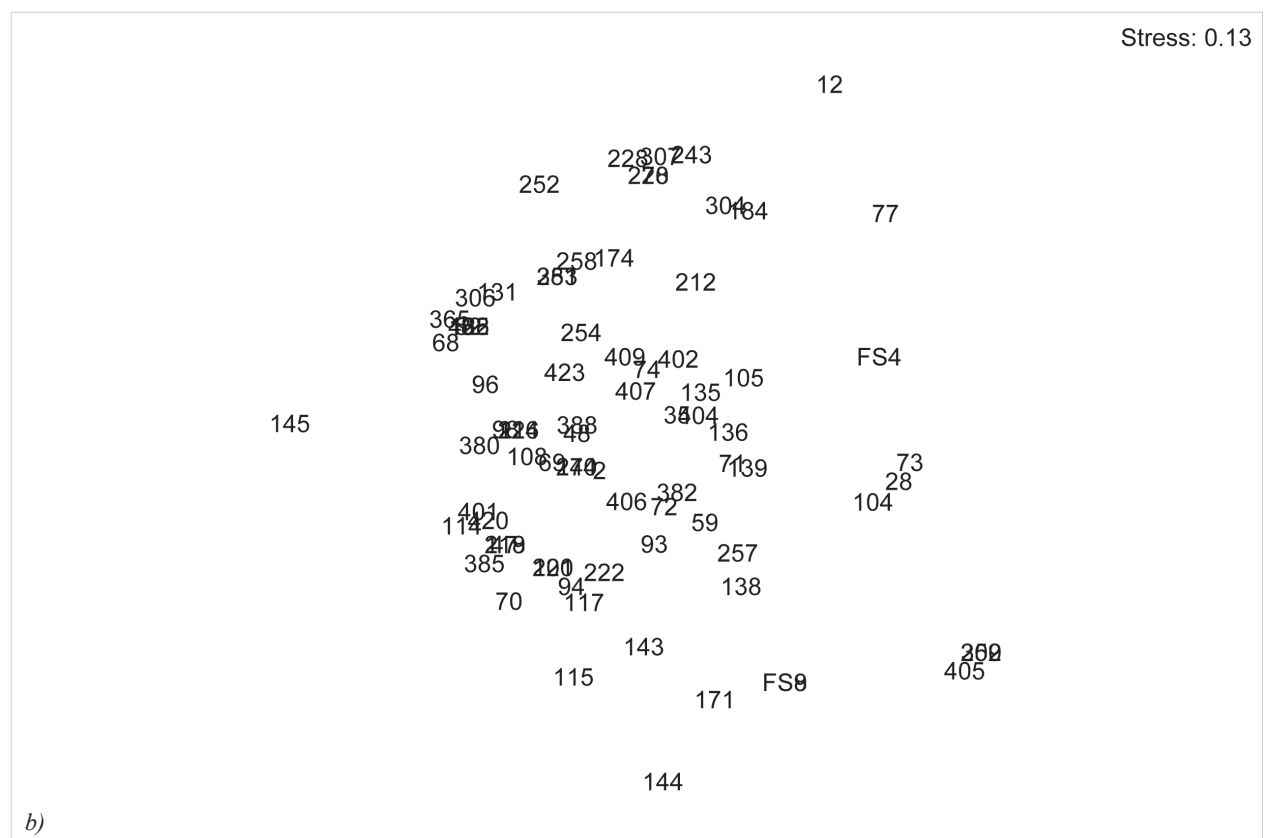
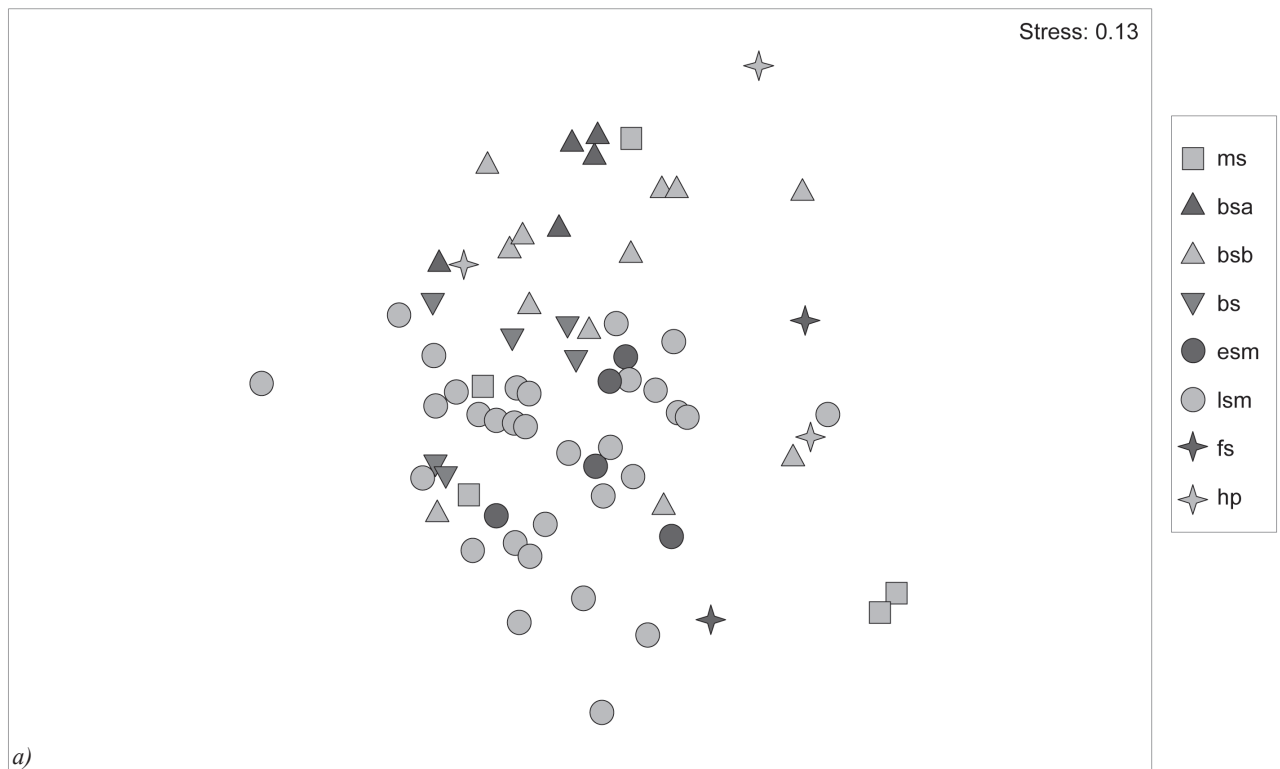


Figure 7. a) MDSCAL scattergram based on ware data (arranged by sub-unit); b) MDSCAL scattergram based on ware data (arranged by site no.).

Table 6. Results for the similarity percentage (SIMPER) analysis on fabric data before reconfiguration of Early Sheikh Muftah sites (cut-off set at 90%)

		Sub-unit							<i>hp</i>
		<i>ms</i>	<i>bsa</i>	<i>bsb</i>	<i>bs</i>	<i>esm</i>	<i>lsm</i>	<i>fs</i>	
<i>Fabric</i>	1A	11.76	75.75	56.67	40.92	31.69	36.12	50.00	–
	1B	44.12	–	30.74	45.10	40.44	48.80	50.00	–
	1C	–	–	–	–	17.60	9.44	–	–
	2A	–	–	4.95	3.94	–	–	–	–
	2C	44.12	–	–	–	–	–	–	100.00
	3A	–	–	–	3.94	–	–	–	–
	4A	–	–	–	–	2.97	–	–	–
	5B	–	20.08	–	–	–	–	–	–
	cumulative %	100.00	95.83	92.36	93.90	92.70	94.36	100.00	100.00

Table 7. Results for the similarity percentage (SIMPER) analysis on fabric data after reconfiguration of Early Sheikh Muftah sites (cut-off set at 90%)

		Sub-unit							<i>hp</i>
		<i>ms</i>	<i>bsa</i>	<i>bsb</i>	<i>bs</i>	<i>esm</i>	<i>lsm</i>	<i>fs</i>	
<i>Fabric</i>	1A	11.76	75.75	56.67	40.92	74.13	28.99	50.00	–
	1B	44.12	–	30.74	45.10	10.36	54.39	50.00	–
	1C	–	–	–	–	10.33	11.38	–	–
	2A	–	–	4.95	3.94	–	–	–	–
	2C	44.12	–	–	–	–	–	–	100.00
	3A	–	–	–	3.94	–	–	–	–
	4A	–	–	–	–	–	–	–	–
	5B	–	20.08	–	–	–	–	–	–
	cumulative %	100.00	95.83	92.36	93.90	94.82	94.76	100.00	100.00

Table 8. Results for the similarity percentage (SIMPER) analysis on ware data before reconfiguration of Early Sheikh Muftah sites (cut-off set at 90%)

		Sub-unit							<i>hp</i>
		<i>ms</i>	<i>bsa</i>	<i>bsb</i>	<i>bs</i>	<i>esm</i>	<i>lsm</i>	<i>fs</i>	
<i>Ware</i>	Hp1	–	–	29.27	62.15	16.78	28.15	–	–
	Hp2	22.22	–	8.30	15.90	39.57	48.19	–	–
	Hp3	–	–	–	–	14.02	10.47	–	–
	Hp6	–	–	3.64	–	–	–	–	–
	Hp8	–	–	–	–	–	–	–	100.00
	Hm1	–	81.31	42.59	15.13	13.65	–	–	–
	Hm2	–	–	8.83	–	–	–	–	–
	Hm7	77.78	–	–	–	3.70	–	–	–
	Hm10	–	9.35	–	–	–	–	–	–
	Hx2	–	–	–	–	4.46	4.15	100.00	–
	cumulative %	100.00	90.66	92.63	93.18	92.18	90.96	100.00	100.00

surface treatment data would remain after cross-tabulation with the fabric data. The results of the analysis were encouraging. The scattergram (Fig. 7a–b) represents the fourth reduction of data: Locs 088, 169, 250, 261, 270, 276 and FS5 were excluded from the outset as none of these provided information on surface treatment, and Locs 005, 064, 076, 103, 109, 134, 210, 269, 275 and findspot FS1 were subsequently removed as they disproportionately skewed the output, due to anomalous fabrics/surface treatments. The overall arrangement of Bashendi and

Sheikh Muftah sites is striking and brings greater definition to the pattern emerging in the fabric data (see Fig. 4a–b) indicating that surface treatment is particularly strong in driving the patterns. The obvious exceptions here are the Masara sites, only one of which sits at the top of the Bashendi A group, while the others are found in the bottom half of the scattergram (Fig. 7a–b) among the Sheikh Muftah sites. The spread of Early Sheikh Muftah sites is also slightly problematic, and this point is addressed below. In any case, the patterns from this final scattergram were

Table 9. Results for the similarity percentage (SIMPER) analysis on ware data after reconfiguration of Early Sheikh Muftah sites (cut-off set at 90%)

		Sub-unit							
		<i>ms</i>	<i>bsa</i>	<i>bsb</i>	<i>bs</i>	<i>esm</i>	<i>lsm</i>	<i>fs</i>	<i>hp</i>
<i>Ware</i>	Hp1	—	—	29.27	62.15	10.72	26.10	—	—
	Hp2	22.22	—	8.30	15.90	10.81	49.86	—	—
	Hp3	—	—	—	—	—	12.37	—	—
	Hp6	—	—	3.64	—	10.60	—	—	—
	Hp8	—	—	—	—	—	—	—	100.00
	Hm1	—	81.31	42.59	15.13	56.92	—	—	—
	Hm2	—	—	8.83	—	—	—	—	—
	Hm7	77.78	—	—	—	—	—	—	—
	Hm10	—	9.35	—	—	—	—	—	—
	Hx2	—	—	—	—	—	4.30	100.00	—
	Hmd1	—	—	—	—	2.49	—	—	—
	cumulative %	100.00	90.66	92.63	93.18	91.54	92.63	100.00	100.00

considered strong enough to be used as the main guide in the following characterisations of pottery for each unit.

One of the limitations of the MDSCAL is that it does not reveal what is driving the patterns. In order to obtain this information, a similarity percentage (SIMPER) analysis was undertaken. This secondary analysis, also run through Primer5, works off the same sample data matrix as the MDSCAL and provides similar information, but in the form of percentage values. These are calculated within each factor group, and between factor groups. The results, which have been converted to tables (Tables 6–9) specify which variables (i.e. fabric/ware) are dominant in a factor group and are therefore responsible for the clustering of sites seen on the MDSCAL scattergram. The SIMPER analysis was conducted twice on fabric and ware data only, with the second run (Tables 7 and 9) undertaken in light of findings presented in this chapter. The results are discussed below in relation to the relevant factor groups.

4.3 Accounting for pottery from Masara sites

Of the 35 or so sites belonging to the Masara unit (Fig. 8),⁵ pottery has been collected from Locs 076, 200, 218, 224, 243 and 259.⁶ A large collection of sherds was also recovered from Loc. 405, previously referred to as the findspot ‘... 200 m east of the Bashendi B site Loc. 271’ (Hope 2002, 40). As this site offered no other material culture (M. McDonald pers. comm., 2002), its identification as a Masara locality rests wholly on the pottery finds, which is problematic for reasons discussed below.

The remains of an estimated 15 vessels were recovered from these sites.⁷ The preservation of the material is generally poor due to extensive exposure to sand/wind blasting. All finds exhibit conspicuous post-depositional wear in the form of worn surfaces which in some cases has completely removed the original treatment. Most of the finds are quite small, though a sense of vessel morphology can be gleaned from the curvature of some body sherds. Sherds from Loc. 405 indicate that vessels could be quite

large with a height and perhaps width somewhere within the range of 25–30 cm, while a rimsherd from Loc. 224 indicates that vessels could also be quite small. In both cases, vessel shape appears to be simple and unrestricted. Wall thickness generally ranges 5.5–9.5 mm, though some examples reach 14.0 mm – presumably from the basal section of vessels.

Nine fabrics are represented in the collection from Masara sites. The most frequently occurring are the 1B and 2C fabrics (Fig. 9), though as we are dealing with only three examples each this cannot be considered a strong trend. Other fabrics include two examples of the 1A and an example each of the 1C, 2A, 3A, 3E, 5A and 5B. Examples of the 1A and 1B fabrics along with the 3E fabric are the only finds to preserve plain surface treatments. The remainder of the fabrics are compacted, or exhibit no discernible treatment at all (Fig. 10). Only the Hp2 and Hm7 wares are shared between sites.

The apparent displacement and irregular spread of Masara sites revealed in the MDSCAL (Fig. 7a–b) was not unexpected. In a paper published some years ago (Warfe 2006) I suggested that contrary to earlier reports (Hope 1998; 2002; Hope and Tangri 1999) the pottery recovered from Masara sites was, in fact, of a later date. An exception was made for the 3E finds from Loc. 076 which do not appear to be locally made and could have entered the oasis during the early Holocene period, perhaps at the hands of the Masara. Even if this was the case, the argument as it now stands is that the Masara inhabitants were not pottery producers.

This argument was formulated on a few grounds. One point was that the Masara A/B groups were part of a wider cultural horizon that was aceramic. Another point highlighted the incompatibilities between the lithic technological organisation and pottery production (Warfe 2006, 24–6). The main argument, however, was based on a reassessment of Hope’s (2002) findings. He found that the bulk of pottery from Masara sites was of the coarse shale variety, identified in the current study as Fabrics 2B and

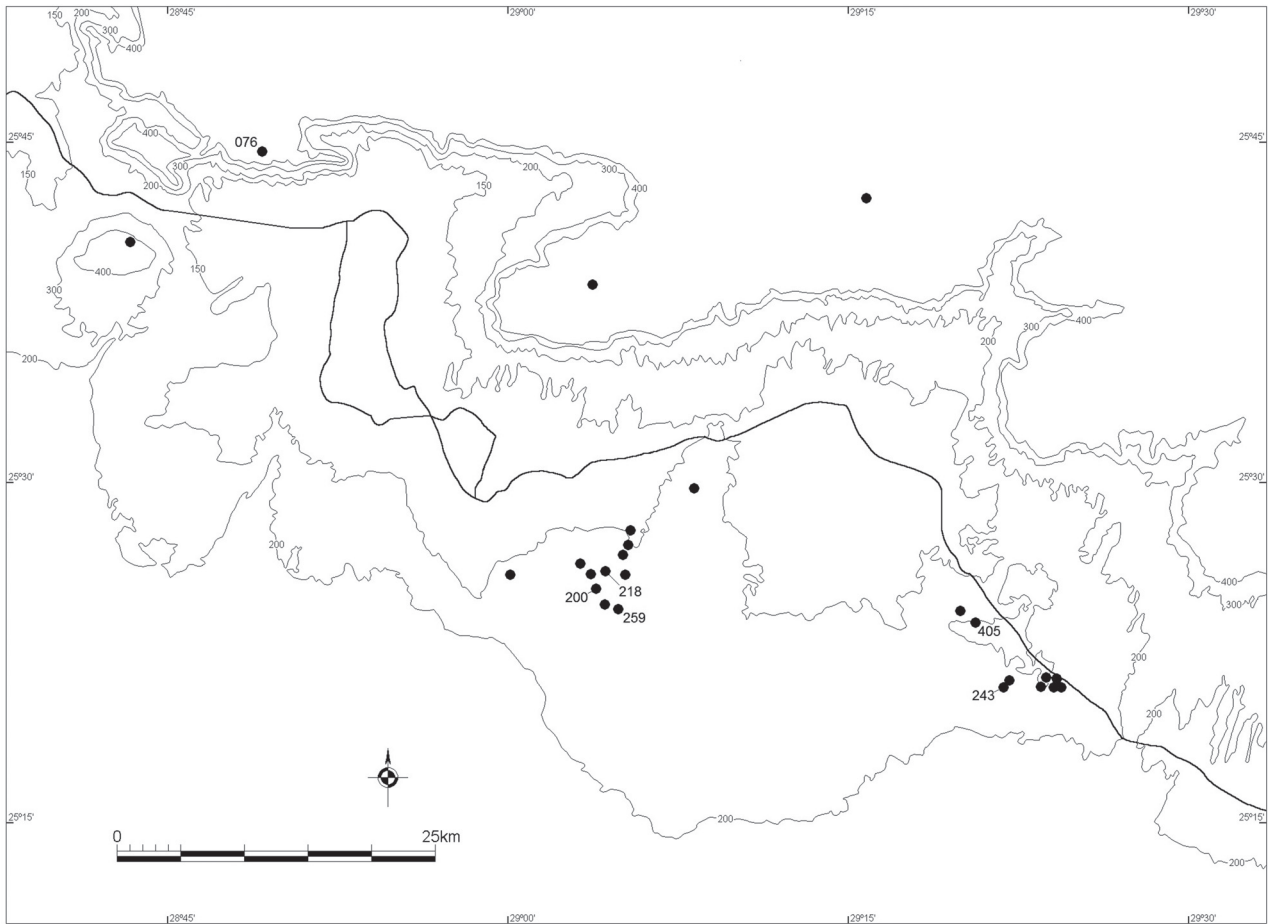


Figure 8. Map of Dakhleh identifying Masara sites mentioned in text.

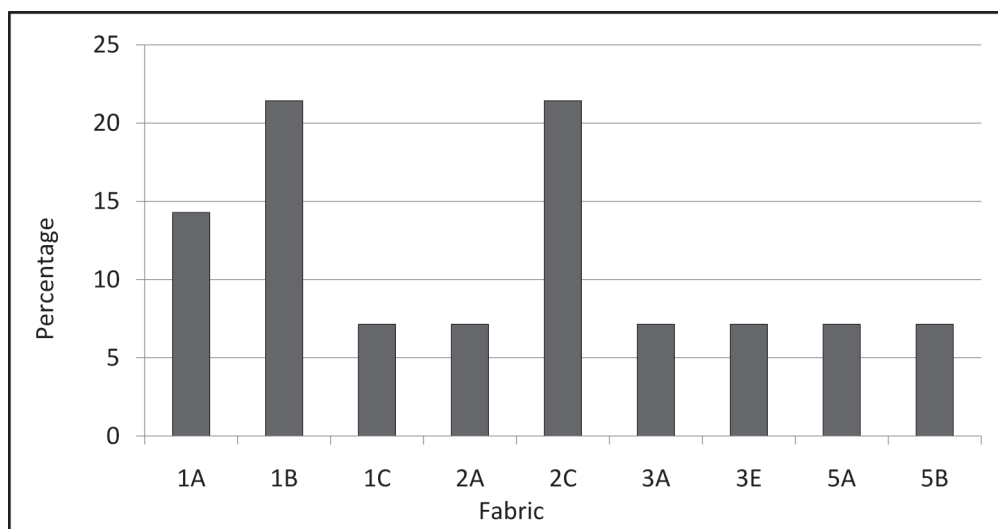


Figure 9. Percentage frequencies of fabrics from Masara sites.

2C. Because the coarse shale pottery was rare on Bashendi and Sheikh Muftah sites, Hope (2002, 40) argued for a Masara association. Subsequently, the few sand-and-shale finds on Masara sites, identified here as Fabrics 1A and 1B, were seen as products of the Bashendi culture and considered intrusive to the Masara sites.

A few things have now changed. First, the more systematic collection of pottery from Sheikh Muftah sites has yielded a substantial quantity of coarse shale pottery, confirming the use of this fabric in the later part of the mid-Holocene.⁸ Second, Hope's argument hinged on the finds from Loc. 405, yet there is no corroborating evidence

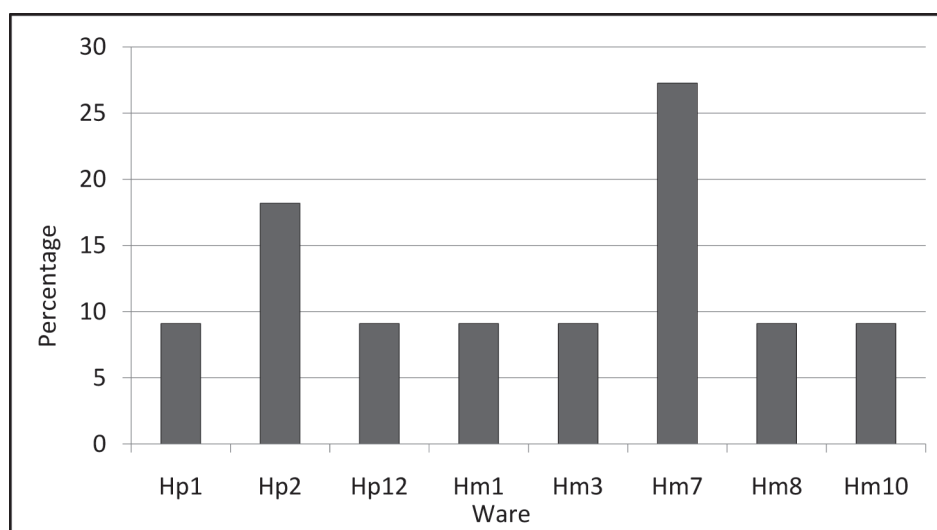


Figure 10. Percentage frequencies of wares from Masara sites.

that this site was occupied by Masara groups. Although located in the vicinity of other Masara sites in the Southeast Basin, it is more within Bashendi territory (Fig. 8; see also Fig. 11). Third, all the material found on Masara sites, with the exception of the 3E fabric from Loc. 076, is recorded in the collections from Bashendi and Sheikh Muftah sites.

In sum, there is very little evidence for pottery production by Masara groups and what has been found on early Holocene sites was more likely deposited by later occupants. The pottery from Loc. 243 compares closely with the Bashendi material (see below), while the finds from Locs 218 and 224 are similar to Sheikh Muftah pottery, which is indicated by the position of these sites on the MDSCAL scattergram (Fig. 7a–b). The position of Locs 200, 259 and 405 in the bottom right-hand corner of the scattergram is peculiar and complicates attempts to assign these sites to an existing unit. The coarse shale pottery from Locs 200, 259 and 405 is very similar to material from both Bashendi and Sheikh Muftah sites. Locality 200 can probably be assigned to the Bashendi unit. In addition to the coarse shale pottery, Loc. 200 has also yielded other Bashendi-like material. The pottery from Loc. 259 is almost identical in fired colour, surface treatment and wall thickness to the coarse shale examples from Loc. 200 and may also be the product of the Bashendi industry. By contrast, the pottery from Loc. 405 is slightly coarser, and more like Sheikh Muftah examples.

4.4 Characterising the Bashendi pottery tradition

Thirty-three sites listed in the appendix belong to the Bashendi unit (Fig. 11). Ten of these (Locs 103, 174, 228, 261, 269, 270, 275, 278, 306 and 307) are identified as Late A sites, while 17 others (Locs 074, 077, 104, 116, 125, 184, 210, 212, 252, 253, 254, 257, 258, 276, 302, 304 and 385) are identified as phase B sites (Churcher 1999a;

Hope 2002, 41–5, 58; McDonald 2002a). The spread of Bashendi A and B sites on the MDSCAL scattergram (Fig. 7a–b) provides further support for McDonald's (1998) division of the cultural unit based on non-ceramic artefact categories, site location, site features, radio-chronometric data and subsistence evidence.

A further six sites (Locs 401, 407, 409, 420, 422 and 423) discovered more recently also yielded Bashendi-like material culture (pers. observ., 2005). At the time of this study, the sites had not yet been ascribed to either Bashendi sub-unit, and were entered into the MDSCAL analysis as a generic Bashendi 'bs' factor group. An attempt is made here to connect these sites with the sub-units through the pottery.

4.4.1 Bashendi A

The combined material from the Bashendi A sites represents an estimated 20 vessels. Preservation of the material is reasonable, to the point that surface treatment may be identified. Rimsherds are too small to offer diagnostics, though the curvature of a few larger body sherds indicates that the vessels were originally small or medium in size, with simple contours. The wall thickness of the sherds generally ranges 3.0–7.0 mm, and surfaces are often very even and smooth. Occasionally, surfaces are spotted with fire clouds and a few sherds have blackened upper exteriors.

Nine fabrics were recorded in total. The most frequent is the 1A fabric, with seven examples followed by three examples of the 5B fabric and two examples each of the 3D, 4E, and 5A fabrics (Fig. 12). The remainder of the collection is made up of one example each of the 1B, 3A, 3F and 4B fabrics. The SIMPER analysis confirms that the 1A and 5B fabrics drive Bashendi A site similarities (Tables 6 and 7).

Fourteen of the estimated 20 vessels preserve surface treatment. Compacted wares are more common (Fig. 13), examples of which (Hm1, Hm2, Hm10) were found on

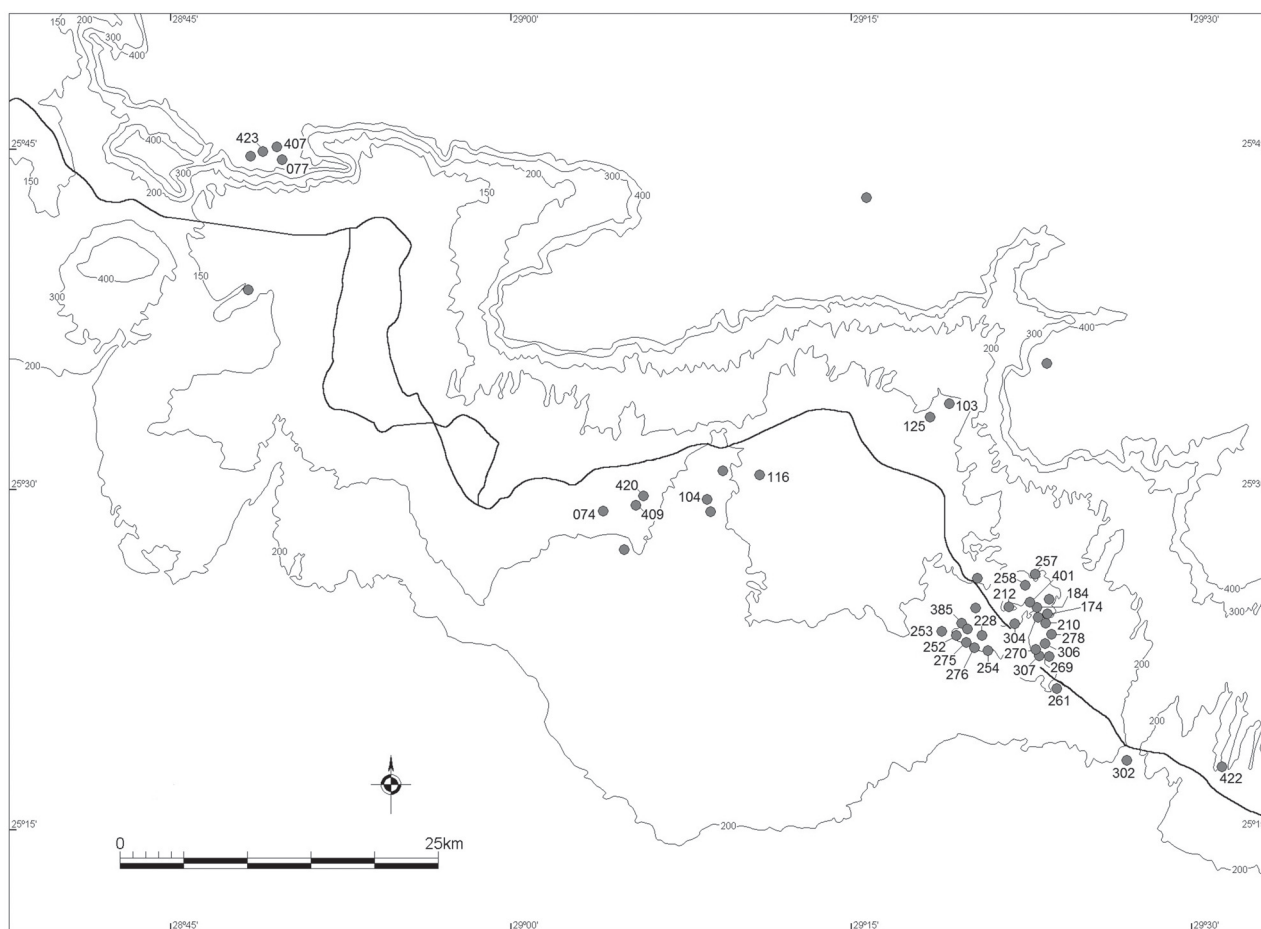


Figure 11. Map of Dakhleh identifying Bashendi sites mentioned in text.

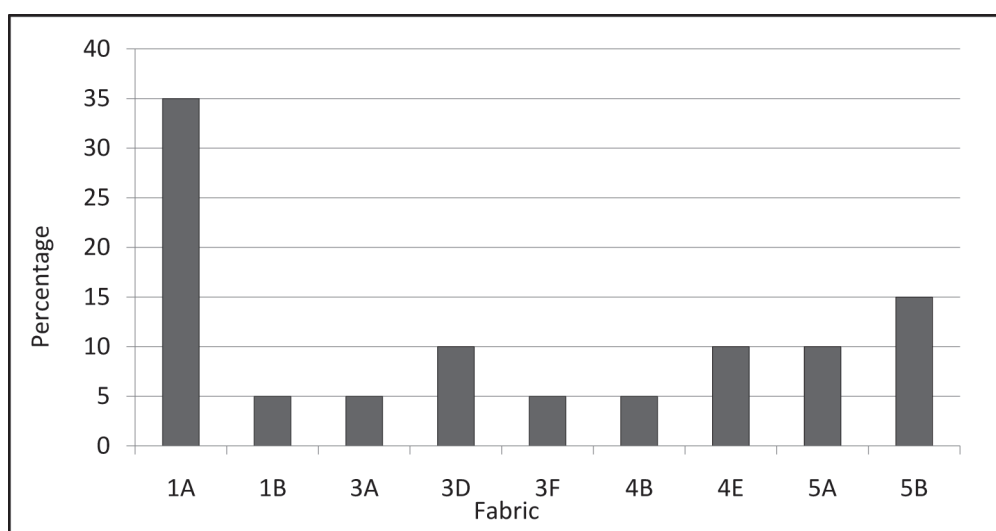


Figure 12. Percentage frequencies of fabrics from Bashendi A sites.

six of the 10 sites. Plain wares (Hp1, Hp17, Hp19) were collected from four sites and two examples of Hd4 were found on two sites. The SIMPER analysis indicates that the Hm1 and Hm10 wares, or compacted versions of the common 1A and 5B fabrics respectively, are driving site similarities (Tables 7 and 9).

Although the quantity and variety of pottery is comparable to that found on Masara sites, it is likely that the Bashendi A were ceramic producers. There are a few reasons for this. First, stronger patterns can be detected here than with the Masara material. Not only is there a predominance of the one fabric, which is

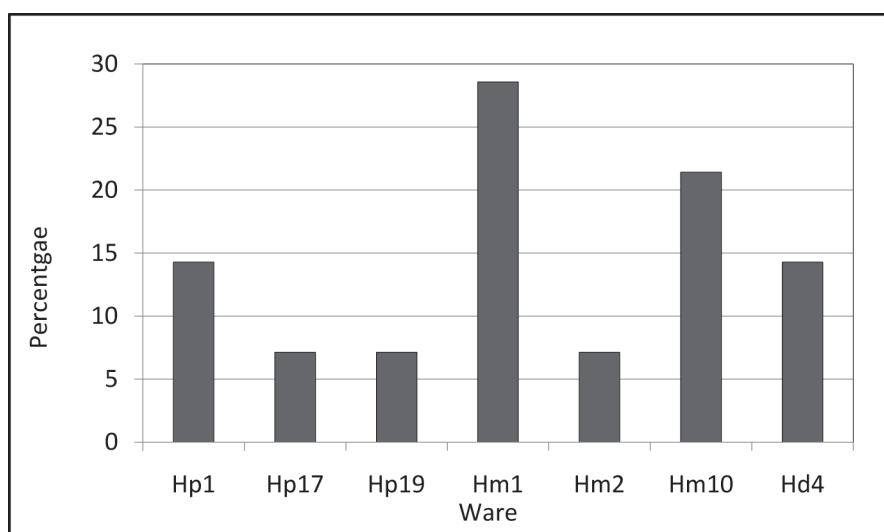


Figure 13. Percentage frequencies of wares from Bashendi A sites.

suggestive of an ongoing tradition attested in the phase B collection as well (see below), there also seems to be a preference for fabrics that are closed-bodied with fine non-plastics inclusions. In addition, there was a preference for compacted surfaces (Fig. 13), and it is noteworthy that the bulk of Bashendi A material has relatively uniform wall thickness and even surfaces. It seems that at this early stage of pottery production in the oasis, potters were investing considerable time and effort in producing and finishing their products.

The problem remains that most of this material was recovered from surface contexts, which presents difficulties in drawing secure associations with the excavated material from these sites. The only find from an excavated deposit comes from Loc. 270 (Hope 2002, 41; for excavation reports see McDonald 1999a and McDonald and Walker 1999). Regrettably the treatment cannot be determined, and the 3F fabric has not been reported from any other Bashendi A site, or phase B site for that matter. Nonetheless, the closed-bodied matrix and fine inclusions are consistent with the Bashendi A pottery and this find is taken as supporting evidence for pottery production in the oasis at this time.

In characterising the pottery from Bashendi A sites it is useful to discuss the more anomalous finds. Two sites might be mentioned here: Locs 103 and 275. The pottery from Loc. 275 was sufficiently dissimilar to any other finds, except for some on Loc. 307, that this site had to be removed from the MDSCAL analysis to avoid disproportionate skewing of the site distribution. The points of difference relate to both fabric and surface treatment. The coarse 3D fabric was the only material found on Loc. 275 and one of two finds from Loc. 307. In both cases, the exterior surfaces preserve impressed patterns (Pl. 2f), and are the only examples of decorated pottery from phase A sites. The uniqueness of this

fabric and treatment combination (Hd4 ware) indicate these examples may not be part of the local tradition, a conclusion supported through thin-section analysis (Chapter 6).

Locality 103 was also removed from the MDSCAL analysis. The three finds from Loc. 103 are distinct from the bulk of Bashendi A material in that they are all medium-coarse vegetal fabrics. Included among the finds is one of only two examples of the 4B fabric, and two examples of the slightly more common 4E fabric. Unfortunately, the finds are very poorly preserved and only one of the 4E examples preserves a plain surface treatment (Hp17). It is difficult to tell whether these are imports. The use of organic temper is unusual, and it is noteworthy that Loc. 103 is the only phase A ceramic site not clustered in the Southeast Basin (Fig. 11). But as it stands, this is not strong enough evidence to indicate non-local origins.

4.4.2 Bashendi B

The remains of an estimated 98 vessels have been recovered from Bashendi B sites. The preservation of the pottery is comparatively better than the Bashendi A and a few shapes could be determined. The pottery is also susceptible to post-depositional erosion as much of it is low-fired and particularly thin-walled: some examples are less than 3.0 mm in thickness. The collection includes 16 fabrics (Fig. 14) and examples of all surface treatments, with the exception of the 'textured' and 'textured-and-decorated' varieties (Fig. 15). The shapes determined come from subclasses 1, 2, 3, 4, 5 and 6 (Fig. 16). In all cases, the original vessel size appears to have been small or medium.

The fine sand-and-shale Fabric 1A is the most common fabric with examples recovered from 11 sites (Fig. 14). Slightly less than half these examples preserve a medium

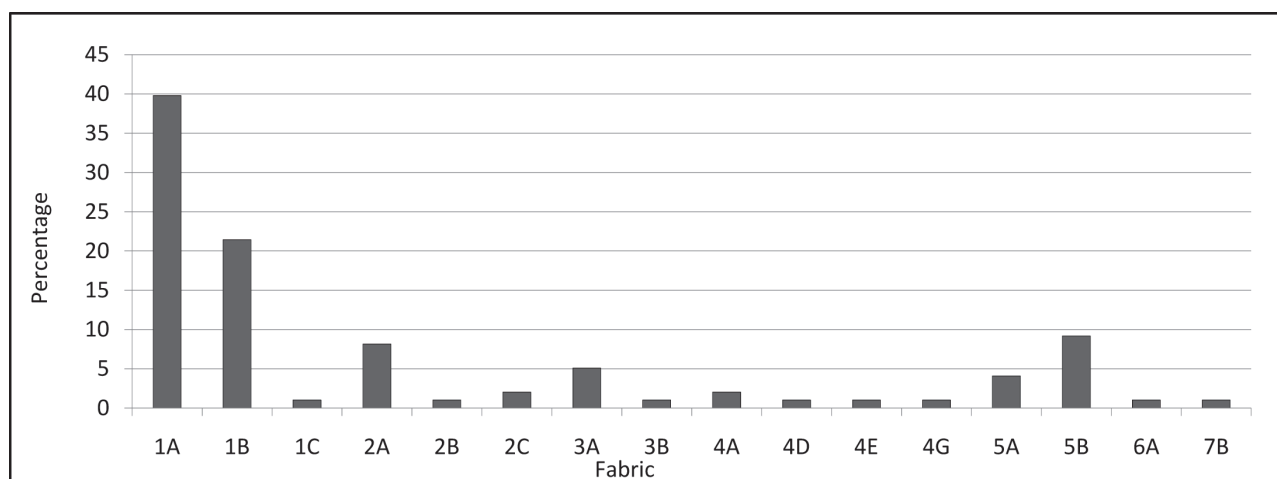


Figure 14. Percentage frequencies of fabrics from Bashendi B sites.

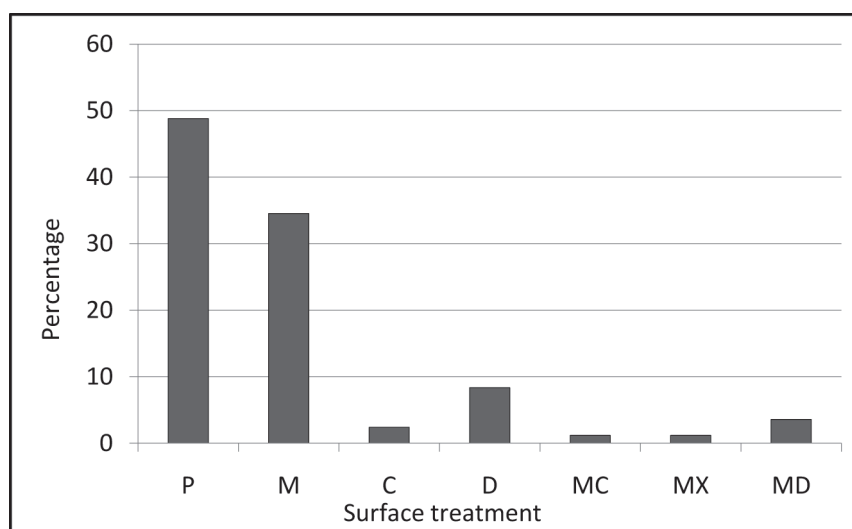


Figure 15. Percentage frequencies of surface treatments from Bashendi B sites.

or high compaction; the Hm1 ware forms almost a quarter of the phase B assemblage (Fig. 17) with examples found on eight sites. Shapes associated with this ware come from subclasses 1 and 6 (Pls 26g–h and 28a–c).

The plain version of the 1A fabric (Hp1) is also dominant in the collection (Fig. 17). Fourteen examples were recovered from seven sites, two of which have subclass 4 and 5 shapes (Pl. 26d–e). An example of the 1A fabric with a compacted-and-textured surface treatment (Hmx1) was found on Loc. 258 and three decorated examples of the 1A fabric were recorded, all from Loc. 074. Two of these have complex patterns on the exterior surface (Pl. 12g–h), and the third, which is also compacted, has complex patterns on both the interior and exterior surfaces (Pl. 12m).

The second most common fabric in the Bashendi B collection is Fabric 1B (Fig. 14), with twenty-one examples found on 10 sites. A small range of surface treatments and shapes are associated with this fabric. Six examples of the Hp2 ware were recovered, some

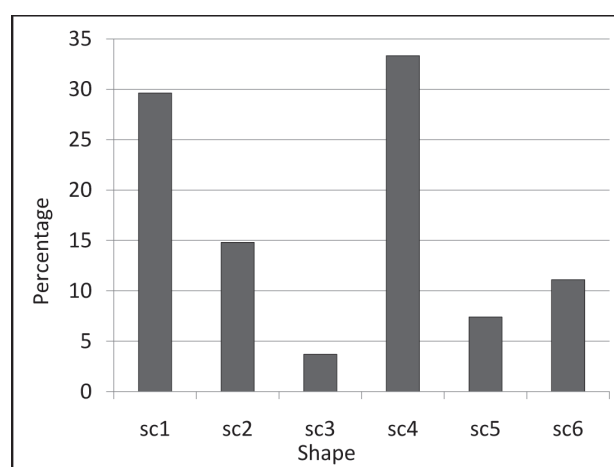


Figure 16. Percentage frequencies of shapes from Bashendi B sites.

with subclass 4 and 5 shapes (Pl. 15c–d), along with five examples of the Hm2 with subclass 4 and 6 shapes (Pls 12n and 26i–j). Three examples of the Hd2 ware were recovered from Loc. 074, two of which bear complex

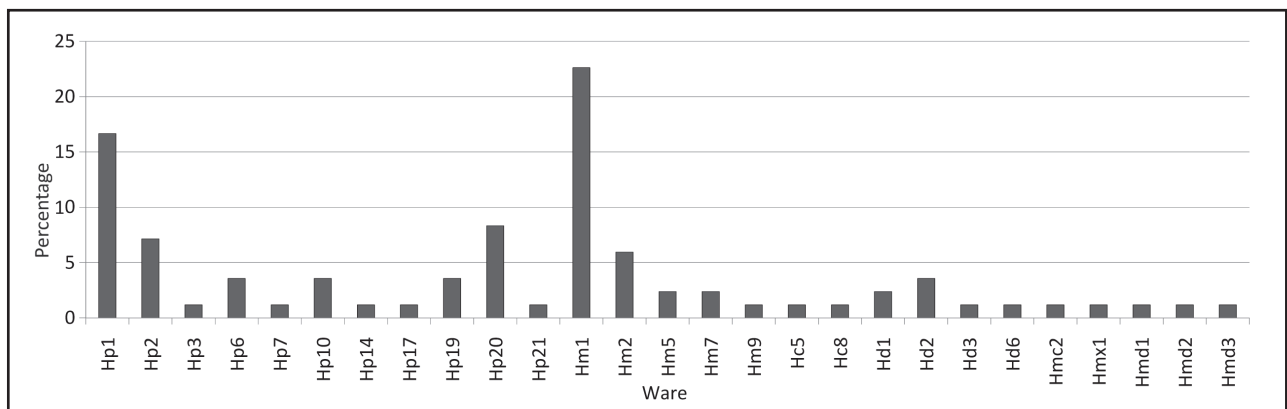


Figure 17. Percentage frequencies of wares from Bashendi B sites.

decoration (Pl. 12i–j) and the third with rim-top decoration (Pl. 12k). An example of the Hmd2 ware was recovered from Loc. 212. In this case the decoration involves a rim-top pattern (Pl. 26l).

Fabrics 2A and 5B appear in similar frequencies and together form close to 20 per cent of the Bashendi B collection. Examples of the 2A fabric were found on five sites. Three of these are plain (Hp6), two are compacted (Hm5) with subclass 4 shapes (Pls 13k and 26k), one is decorated (Hd3) with a combination of rills and rim-top design (Pl. 12l), another is compacted-and-decorated (Hmd3) with fingernail incisions (Pl. 26m). The 5B fabric has a slightly narrower spread with examples found on four sites. Seven of these are plain (Hp20) and are associated with subclass 1 and 2 shapes (Pls 26f and 28d), and another is coated (Hc8).

Five examples of the 3A fabric were recorded from four sites, three of which are plain (Hp10), and one compacted-and-coated (Hmc2). Four examples of the 5A fabric were recovered from three sites. Three of these are plain (Hp19).

The remainder of the phase B collection is made up of 10 different fabrics. Eight of these (Fabrics 1C, 2B, 3B, 4D, 4E, 4G, 6A and 7B) appear only once in the collection. No treatments could be determined for the 4D and 7B fabrics. The 1C, 2B, 4E and 6A fabrics are plain (Hp3, Hp7, Hp17 and Hp21 wares), the 3B fabric is coated (Hc5) and the 4G fabric is decorated (Hd6) with an imitation basketry-impressed design (Pl. 2d). Both the coarse-straw fabric and the decoration are unusual to this collection and possibly represent an import (section 6.1).

The other two fabrics (2C and 4A) are slightly more common in that two examples each were recovered from separate sites. Both examples of the 2C fabric are compacted (Hm7), and so too is an example of the Fabric 4A (Hm9), while the other example is plain (Hp14).

Some strong patterns may be detected in this data set. To begin with, the collection is dominated by a few fabrics that are found on most sites. The SIMPER analysis

indicates that the 1A, 1B and 2A fabrics are responsible for driving the site similarities (Tables 6 and 7), which is to be expected given that these fabrics, along with Fabric 5B, form almost 80 per cent of the collection (Fig. 14). Clearly, there is a preference for fabrics with closed-bodied and medium-bodied matrices and fine inclusions, which seems to represent a continuation of the Bashendi A tradition. The phase B material is also mostly thin-walled and the surfaces are generally even and tactually smooth – this too is characteristic of the phase A pottery.

Some strong patterns can also be detected among the surface treatments. The plain variety is most common followed by the compacted surface treatment (Fig. 15). When cross-tabulating these treatments with the more common fabrics, the Hp1, Hp2, Hm1, Hm2 and Hp20 wares emerge as the dominant range in the collection (Fig. 17), which is reflected in the SIMPER analysis (Tables 8 and 9). Although decoration is not common, with only ten examples recorded from phase B sites, it is noteworthy that these account for over one-third of all decorated examples from the Dakhleh collection – even if one of the examples from Loc. 212 (Hd6) is probably an import (section 6.1). Evidently, the local use of decoration peaked at some point during the phase B period, and probably somewhere near the end given the similarities with pottery from a few Early Sheikh Muftah sites (see below).

Some general points on shape may be offered. The dominant varieties come from subclasses 1 and 4 (Fig. 16). This is followed by four examples from subclass 2, three examples from subclass 6, two examples from subclass 5 and one from subclass 3. Interestingly, the unrestricted (subclasses 1, 2 and 3) and restricted forms (subclasses 4, 5 and 6) appear in almost equal frequencies. Another point of interest concerns the size of the vessels. All examples fall within the small or medium range of vessel size – even the largest examples are no more than 25 cm at their widest and probably of an equal or lesser measurement in height. Despite expressing doubts over whether vessel shape is a useful criterion for determining trends, an attempt was made to seek correlations between

specific shapes and wares. This was done by examining the frequency distribution of the data. The only pattern that appears to emerge concerns the decorated wares. Of the seven examples recorded with shape determinants, five are associated with unrestricted forms.

To complete the characterisation of the Bashendi B pottery, it is noted that coarser versions of the sand-and-shale and shale-rich varieties (1C, 2B and 2C) are present, and so too is a range of vegetal-tempered fabrics (4A, 4D, 4E and 4G). For the first time, there are also examples from Fabric Families 6 and 7. As for treatments, the few examples of coated and combined wares clearly points to an expansion in the range of surface treatments during the later Bashendi period.

These trends go some way in explaining the placement of Locs 104, 257 and 385 on the scattergram (Fig. 7a–b). Several fabrics (e.g. 1B, 2C and 7B) recorded from these sites, and the corresponding wares, are especially common to the Sheikh Muftah tradition and this connection is responsible for pulling these sites into the lower half of the scattergram.

4.5 Accounting for the pottery from sites 401, 407, 409, 420, 422 and 423

The remains of 30 vessels were recovered from these sites. The pottery is generally well preserved and surface treatments were recorded for 24 examples, whereas shape determinants were recorded for only five. To reiterate, these sites were included in the analysis with the view to assigning them to either of the Bashendi sub-units. The ware scattergram (Fig. 7a–b) shows that three sites (407, 409 and 423) could be related to the Bashendi B sub-unit as they sit within the general group. A brief examination of the individual fabrics and surface treatments partially supports this conclusion.

The collection from Loc. 407 includes two examples of the 1A and 1B fabrics and an example each of the 2A and 5B fabrics. This fabric combination as well as the corresponding wares (Hm1, Hp2 and Hp6) compare well to the Bashendi B collection. The general appearance of the pottery from this site is also reminiscent of Bashendi material in terms of the fired colours, evenness of walls, and wall thickness. The collection from Loc. 409 includes four examples of the Hp2 ware, two examples of the Hp4 ware and one example each of the Hm1 and Hp18 wares. Examples of the Hp4 and Hp18 wares have not been recorded in the phase A or phase B collections, whereas the Hm1 is common to both. The Hp2 ware appears in the phase B collection but also features prominently in the Sheikh Muftah collection. It is significant that examples of the Hp2 ware appear in the form of a truncated cone and perforated disc. Neither object has been recorded from Bashendi sites, whereas they are found on Sheikh Muftah sites (below). For this reason, Loc. 409 may have been occupied at the very end of the Bashendi period, or more likely during the Sheikh Muftah period. The presence of

the Hp4 ware on a few Sheikh Muftah sites would support the latter attribution.

The collection from Loc. 423 includes two examples of the Hp1 ware and one example each of the Hm1 and Hp2 wares. These examples compare well with the Bashendi B pottery in fired colours, evenness of walls, and wall thickness. It is also noteworthy that the only shape available from Loc. 423 compares closely to examples from Bashendi B, Loc. 254 (compare Pl. 36g with Pl. 28a–b).

The positions of Loc. 422 and especially Loc. 420 on the ware scattergram (Fig. 7a–b) suggest these sites might hold stronger ties with the Sheikh Muftah. It is difficult to be certain with Loc. 422 which sits superimposed over Late Sheikh Muftah sites 008, 062, 168 and the Bashendi B site 125. Two examples of the Hp1 ware have been recorded from Loc. 422, but this ware is common to both the Sheikh Muftah and Bashendi collections. Regrettably, there is very little about the actual finds (e.g. wall thickness, surface smoothness) to indicate which cultural unit this material should be assigned. The only hint is that one of the finds is relatively low-fired which might suggest that Loc. 422, despite its position on the scattergram, was occupied during Bashendi B times.

The collection from Loc. 420 includes two examples of the Hp2 ware, one example of the Hp10 ware, and one example each of the 1D, 3B and 5B fabrics. The 5B fabric, and to some extent the Hp2 ware, are characteristic of the Bashendi tradition. Otherwise, the 1D fabric is common to the Sheikh Muftah collection, while a few examples of the 3B fabric and Hp10 ware are spread across both Bashendi B and Sheikh Muftah collections. On the basis of these comparisons it is probably safer to treat Loc. 420 as a part of the Sheikh Muftah cultural unit, even though some elements of this site collection are Bashendi-like.

The overlapping position of Loc. 401 with Loc. 420 implies that this site should also be considered part of the Sheikh Muftah. The finds from Loc. 401 include two examples of the Hp10 ware, and an example each of the Hp2 and Hm5 wares. As it was pointed out, the Hp10 cannot be tied down to a specific unit, whereas the Hp2 becomes more common with the Sheikh Muftah collection. It is interesting, however, that the Hm5 ware is found in the earlier collections and that the particular example is thin-walled with very even surfaces in the tradition of Bashendi pottery. The fact that Loc. 401 also appears in Bashendi territory close to Locs 184, 212 and 258 (Fig. 11) is another point to consider, though this cannot be taken as proof of its occupation history. On this point, it is perhaps noteworthy that the two sites identified as possibly Sheikh Muftah, Locs 409 and 420, are both located in an area of oasis lowlands heavily populated by Sheikh Muftah sites (compare Fig. 11 with Fig. 18).

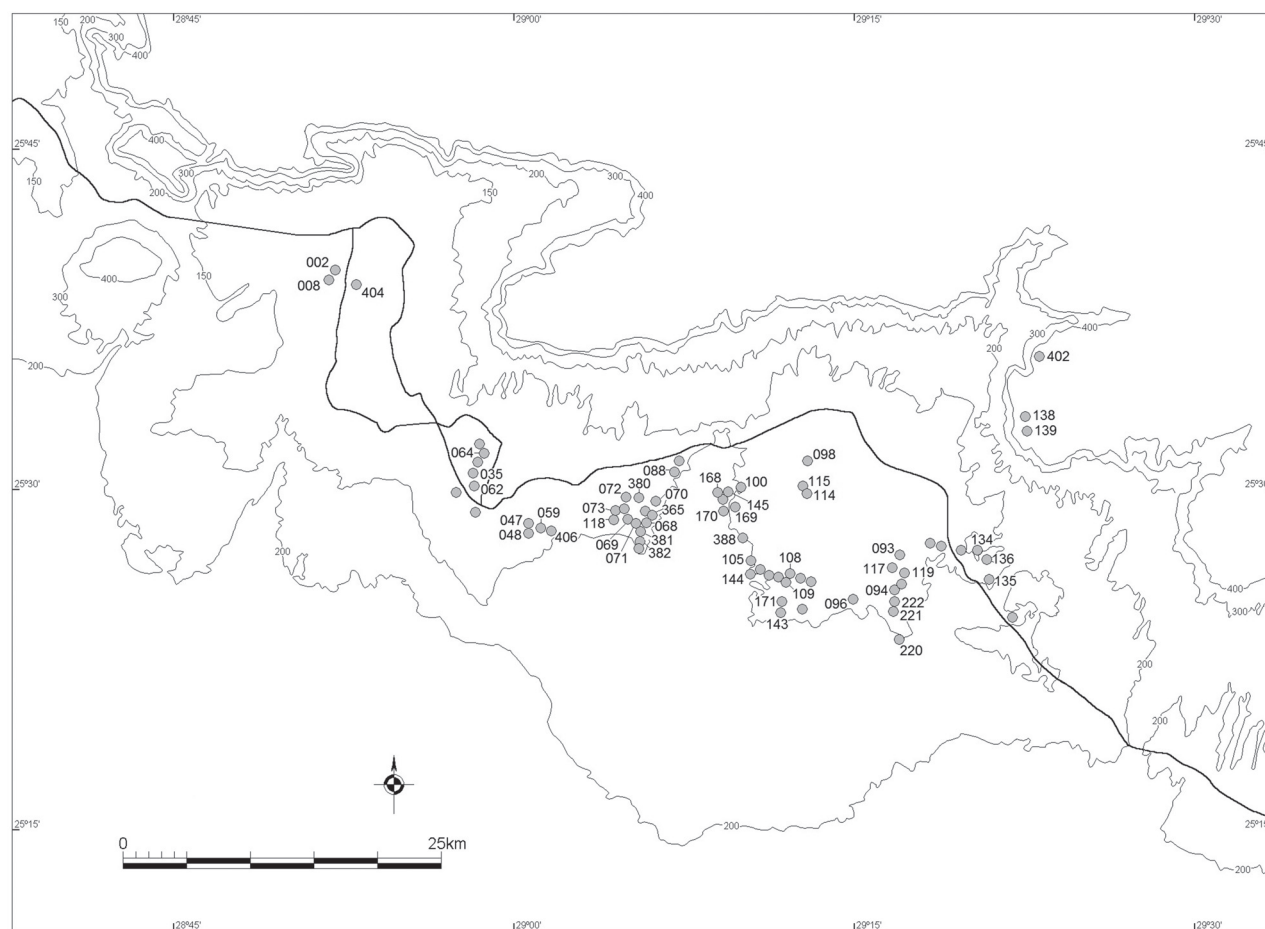


Figure 18. Map of Dakhleh identifying Sheikh Muftah sites mentioned in text.

4.6 Characterising the Sheikh Muftah pottery tradition

The remains of an estimated 764 vessels and miscellaneous ceramic objects have been recovered from 52 Sheikh Muftah sites (Fig. 18). The preservation of the material varies depending on the extent of site deflation and human interference. More than 90 per cent of the finds retain surface treatment and over half offer shape diagnostics.

In characterising the Sheikh Muftah collection it is important to highlight the vast range of fabrics, surface treatments and shapes. Twenty-nine of the 33 fabrics recorded for the prehistoric collection have been identified, along with all surface treatments, shapes and miscellaneous objects. But still a few properties continue to dominate: the 1A and 1B fabrics comprise more than half of the collection, with examples found on 49 sites; examples of the plain surface treatment have been recovered from 46 of the 52 sites and constitute more than three quarters of the collection. Combined, shapes from subclasses 1 and 4 have been found on 39 sites and account for almost 80 per cent of vessel forms. In fact, despite its range of material, the Sheikh Muftah collection is, for the most part, quite similar in appearance. Most specimens retain a reddish-brown fired colour with soot marks and fire clouds mottling the

surface; the surfaces themselves are generally uneven and tactually coarse, which gives the impression that vessels were constructed in a slapdash manner; the asymmetry of vessels and the frequency of undulating rims supports this impression; and wall thickness generally ranges 6.0–9.0 mm in the upper body becoming thicker towards the base. Although this makes Sheikh Muftah pottery readily identifiable in the field, it complicates attempts to distinguish trends within the collection.

In his study of the Holocene pottery, Hope (2002) identified the presence of two Sheikh Muftah phases.⁹ Citing close affinities between the Bashendi B pottery and material from seven Sheikh Muftah sites – Locs 035, 072, 118,¹⁰ 135, 138, 221 and 381 – the first of these phases is labelled ‘transitional’ or ‘Early’. By way of differentiation, the remainder of sites are to be considered ‘Late’ (Hope 2002, 45–51).¹¹

For current purposes, it was important to see whether this distinction still holds, using a more complex method of quantification, as well as a modified classification system and a database that draws from a far greater quantity of material. Testing involved submitting the data to the MDSCAL with recognition of Hope’s (2002) ‘Early/Late’ division. Significantly, the MDSCAL run

on the surface treatment data (Fig. 5a–b) revealed a very clear arrangement of four Early Sheikh Muftah sites between the main groupings of Bashendi and Late Sheikh Muftah sites. This pattern is preserved, to some extent, with the MDSCAL run on the ware data. Two sites identified by Hope, Locs 035 and 135, are broadly positioned between the bulk of Bashendi and Sheikh Muftah groupings (Fig. 7a–b). This offers support to the initial assessment and provides a starting point for the following characterisation of the Sheikh Muftah pottery.

4.6.1 Early Sheikh Muftah

Following Hope (2002), the first step was to identify anything from Locs 035 and 135 that might demonstrate an inheritance of Bashendi B traits. While both sites have yielded examples of the Hp1 and Hp2 wares, these are not overly helpful as points of comparison given the ubiquity of the wares throughout the Dakhleh collection. It is noteworthy, however, that the examples were produced with thin walls and smooth surfaces in the tradition of Bashendi manufacture.

Both sites have also yielded several examples of decorated wares (Hd1, Hd2, Hd3, Hd6, Hmd1). As a rule, decoration is not a feature of the Sheikh Muftah pottery tradition. Of the few examples recorded, at least two are probable imports (Hd8 ware from Loc. 048 and Hmd5 from Loc. 059), two others are unusual examples of rim decoration and rilling (Hd7 and Hxd1 from Loc. 105), and another is a potmark (Hd1 from Loc. 134). The potmark (Pl. 2h) indicates an Early Dynastic or Old Kingdom influence in the oasis and this piece would therefore come from later in the Sheikh Muftah occupation. The sherd itself is also quite thick-walled (7.0–8.0 mm) with slightly uneven surfaces which is typical of the later Sheikh Muftah pottery.

The only other decorated example from the Late Sheikh Muftah collection is the find from Loc. 073. This is produced from the 1A fabric and is relatively thin-walled with a compacted surface and neat rim-top decoration (Pl. 12f). By all accounts, it is a much closer match to the decorated pottery from Locs 035 and 135 (compare Pl. 12f with Pls 9s and 16j). The small collection of decorated material from Locs 035, 073 and 135 compares well to the thin-walled, compacted, rim-decorated material from Bashendi B localities 074 and 212. This short-lived trend seems to mark an overlap in the Bashendi/Sheikh Muftah pottery traditions and serves as one of two points distinguishing an early pottery phase within the Sheikh Muftah tradition. The other is the use of compaction.

A number of Sheikh Muftah sites have yielded a variety of compacted (Hm1, Hm2, Hm3, Hm4, Hm5, Hm6, Hm7, Hm9, Hm11, Hm12, Hm13), compacted-and-coated (Hmc1, Hmc2, Hmc3 and Hmc4), compacted-and-textured (Hmx1 and Hmx2) and compacted-and-decorated (Hmd1 and Hmd5) wares. Most of these occur only once in the collection and are essentially anomalous. Exceptions

to this are the Hm1, Hm2, Hm5, Hm6, Hm7 and Hm13 wares, several examples of which have been recorded from a number of Sheikh Muftah sites – two examples of the Hmd1 ware, discussed above, were also recorded. Five of these wares (Hm1, Hm2, Hm5, Hm7 and Hmd1) are also present in the Bashendi B collection (Fig. 17), in some cases featuring prominently (e.g. Hm1). None of the other wares mentioned above, except for the Hm9, Hmc2 and Hmx1 examples, were recorded in the Bashendi B collection. The Hm1, Hm2, Hm5, Hm7 and Hmd1 wares might therefore be considered to represent another continuum of the Bashendi B tradition.

Examples have been recovered from Sheikh Muftah Locs 035, 071, 072, 073, 093, 135, 136, 138, 139, 220, 381, 382 and 404, which explains why several of these sites appear close together in the scattergram (Fig. 7a–b). But not all of these sites are ‘Early’ in nature. Locality 404, for one, is a typical Late Sheikh Muftah site (as defined below), even if a Bashendi-like find was recovered here. Likewise, the pottery from Locs 071, 072, 093, 138 and 382 also compares with the bulk of Late Sheikh Muftah material in terms of wall thickness, uneven surfaces, undulating rims and a lack of vessel symmetry. Again, despite the presence of some Bashendi traits, these sites are arguably better defined as Late Sheikh Muftah. A similar point can be made for the extensive collection from Loc. 136.

The collection from Loc. 139 also includes a mixture of material, but in this case, the Bashendi-like properties of thin-walled vessels with smoothed even surfaces are more prominent and this site is probably better classified as Early Sheikh Muftah. As for the pottery from Locs 220 and 381, this too compares closely with the Bashendi tradition in fabric and surface treatment as well as secondary features such as wall thickness and surface evenness. In short, Locs 035, 073, 135, 139, 220 and 381 retain a range of Bashendi qualities and could conceivably come earlier in the Sheikh Muftah occupation. These sites are thus used to outline an Early Sheikh Muftah tradition.

The remains of an estimated 71 vessels were recovered from Locs 035, 073, 135, 139, 220 and 381. The range of material represented includes 14 fabrics (Fig. 19), seven surface treatments (Fig. 20) and shapes from all subclasses (Fig. 21). A truncated cone and four perforated discs were also recorded. The pottery is generally well preserved with almost all examples bearing surface treatment and a large number offering shape diagnostics.

The Hp1, Hp2 and Hm1 wares are the most common in the collection (Fig. 22). The Hm1 ware was found on five sites, whereas the Hp1 and Hp2 were found on three sites each. This spread is reflected in the SIMPER analysis reconfigured around the new division of Sheikh Muftah sites (Table 9). The SIMPER analysis also recognises the few examples of the Hp6 ware as equally important in driving site similarities, as these are spread across three sites.

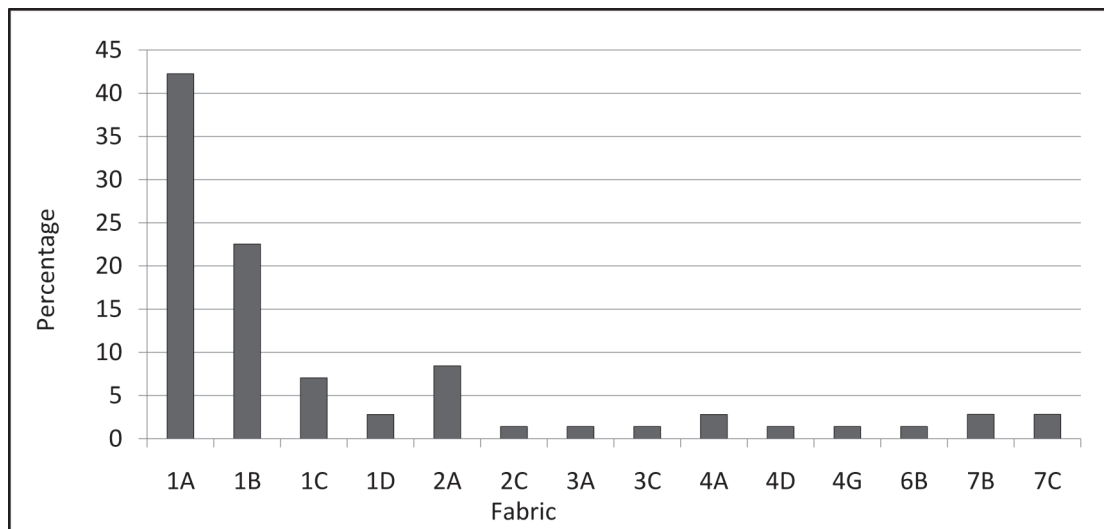


Figure 19. Percentage frequencies of fabrics from Early Sheikh Muftah sites.

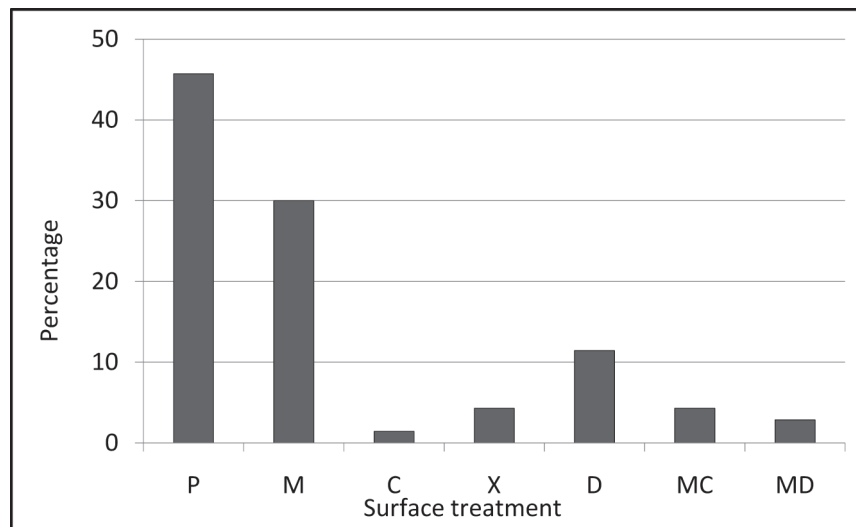


Figure 20. Percentage frequencies of surface treatments from Early Sheikh Muftah sites.

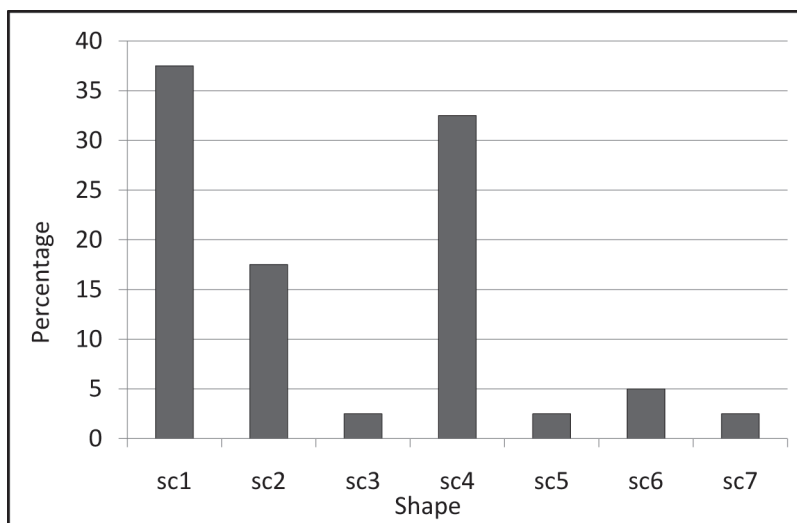


Figure 21. Percentage frequencies of shapes from Early Sheikh Muftah sites.

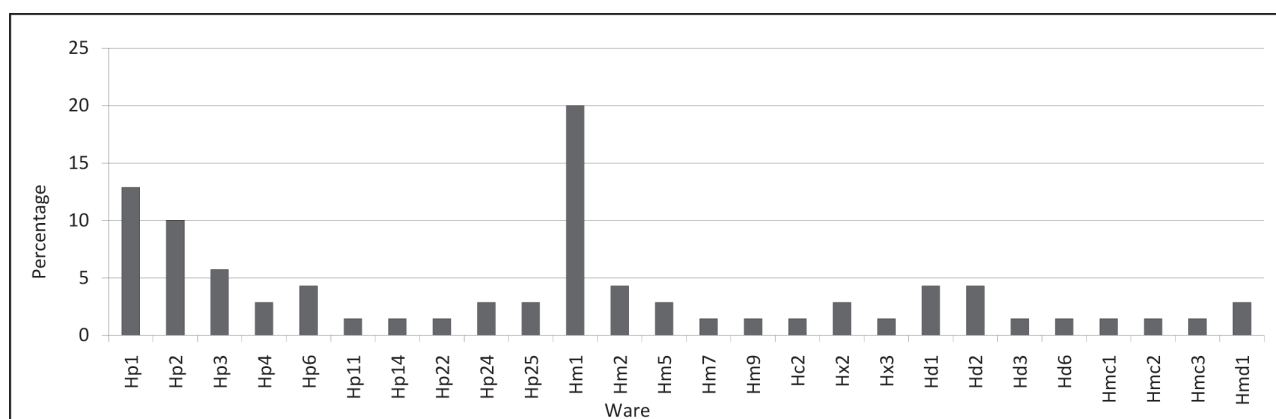


Figure 22. Percentage frequencies of wares from Early Sheikh Muftah sites.

The collection comprises nine examples of the Hp1 ware with shapes from subclasses 2, 4, and 6 (Pls 15o and 9h–j) and seven examples of the Hp2 ware with shapes from subclasses 1 and 4 (Pls 9k–l and 24d). The Hp2 ware was also identified with a truncated cone and a perforated disc (Pls 15q and 16a). The remainder of the plain wares include four examples of the Hp3 ware, two of which are discs (Pl. 16b–c) and the other two with shapes from subclasses 1 and 4 (Pls 9m and 16d); three examples of the Hp6 ware with subclass 1 and 4 shapes (Pls 9o, 12e and 24e); two examples of the Hp4 ware, one with a subclass 4 shape (Pl. 9n) and the other a disc (Pl. 16e); two examples of the Hp24 ware, one with a subclass 3 shape (Pl. 24f); and two examples of the Hp25 ware with subclass 1 and 4 shapes (Pl. 24g–h). The collection also includes one example each of the Hp11, Hp14 and Hp22 wares.

The compacted wares are represented by 14 examples of the Hm1 ware with shapes from subclasses 1 and 2 (Pls 9p–q, 24i and 28k); three examples of the Hm2 ware, one of which has a subclass 1 shape (Pl. 16f); two examples of the Hm5 ware with subclass 1 and 2 shapes (Pls 9r and 16g); an example each of the Hm7 ware with a subclass 1 shape (Pl. 24j) and the Hm9 ware with a subclass 4 shape (Pl. 16h). Also in this collection are two examples of the Hmd1 ware with subclass 1 and 2 shapes (Pls 12f and 16j); two examples of the Hx2 ware with subclass 1 and 4 shapes (Pls 16m and 10b); examples of the Hmc2 ware with a subclass 4 or 5 shape (Pl. 16i); the Hx3 ware with a subclass 4 shape (Pl. 24k); and the Hmc1, Hmc3 and Hc2 wares. Lastly, the decorated wares include three examples of the Hd1 and Hd2 wares (Pls 9s–v and 16k–l), and one example each of the Hd3 ware (Pl. 10a) and the Hd6 ware. The latter is almost certainly an import (section 6.1).

To sum up, the pottery from Locs 035, 073, 135, 139, 220 and 381 shares a number of similarities with the Bashendi B material. The presence of the Hp1, Hp2, Hm1, Hm2, Hd1 and Hd2 wares is sufficient to demonstrate the continuation or extension of the Bashendi tradition into Sheikh Muftah times. In support of this conclusion, much

of the material was also produced with thin walls and even surfaces, and most of the vessels would have been medium in size (i.e. an orifice and height within the bracket of 16–25 cm), in the style of the Bashendi tradition.

Having drawn this association, it is notable that the Early Sheikh Muftah collection also marks an increase in coarser fabrics, namely the 1C variety; an increase in the use of texturing as a surface treatment; and an increase in the size of the vessels – in a few instances the vessel orifice exceeds 25 cm (Pls 9k, 16d, k, m and 24j–k). A few finds also have uneven surfaces, thicker walls and undulating rims: features that will now be shown to dominate the Late (or ‘true’) Sheikh Muftah tradition.

4.6.2 Late Sheikh Muftah

Forty-six sites are identified here as Late Sheikh Muftah.¹² The pottery collected from these sites is considerable in number and variety with the remains of an estimated 693 vessels from which 27 fabrics (Fig. 23), all surface treatments (Fig. 24), vessel shapes (Fig. 25) and miscellaneous objects were identified. Given this range, and the number of permutations that emerge from cross-tabulating ware with shape, the following focuses on identifying trends while the anomalies are mentioned as an adjunct. The data are arranged according to Fabric Family rather than frequency of appearance.

All five ‘sand-and-shale’ fabrics were recorded in this collection. The 1A, 1B and 1C were recovered in large quantities and together form two-thirds of the collection (Fig. 23). The 1A fabric is associated with six surface treatments: plain (Hp1), compacted (Hm1), coated (Hc1), textured (Hx1), decorated (Hd1) and compacted-and-textured (Hmx1); the first of which is the most common (Fig. 26). Examples were recovered from 22 sites and the SIMPER analysis indicates that the Hp1 ware is partially responsible for driving site similarities (Table 9). Shapes recorded for this ware come from all subclasses except subclass 7. The majority of Hp1 shapes fall into subclasses 1 and 4, though this is not peculiar to the ware. The forms associated with the Hp1 ware include small vessels from subclasses 1, 4, 5 and 6 (Pls 13f, 34j, 10e, 29g, 17g, 27e

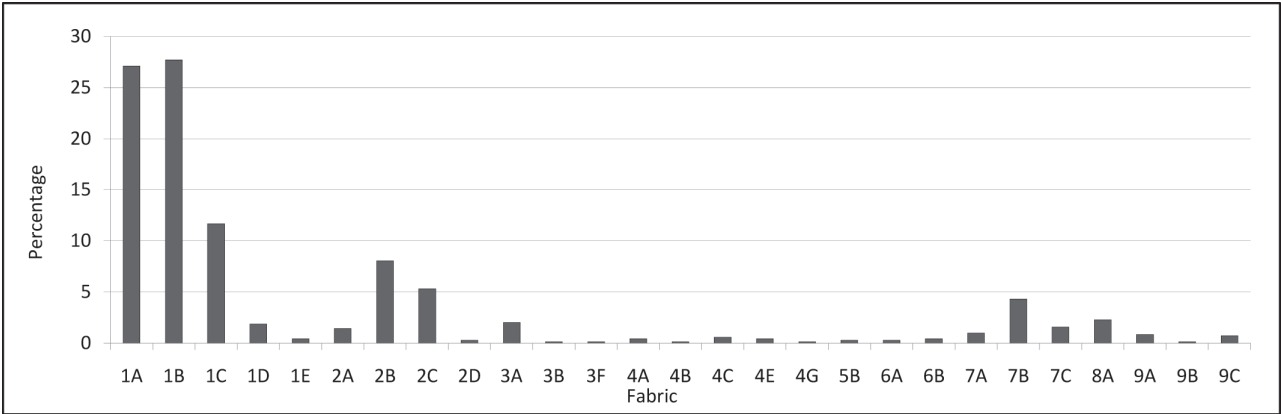


Figure 23. Percentage frequencies of fabrics from Late Sheikh Muftah sites.

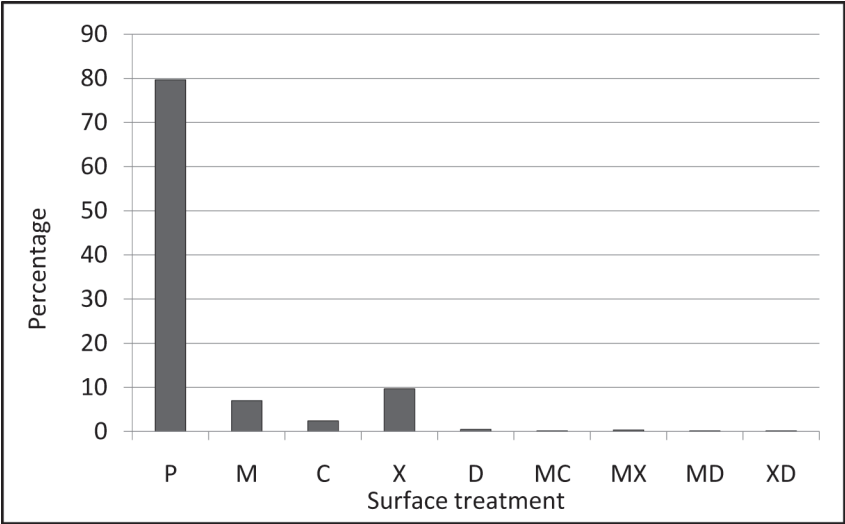


Figure 24. Percentage frequencies of surface treatments from Late Sheikh Muftah sites.

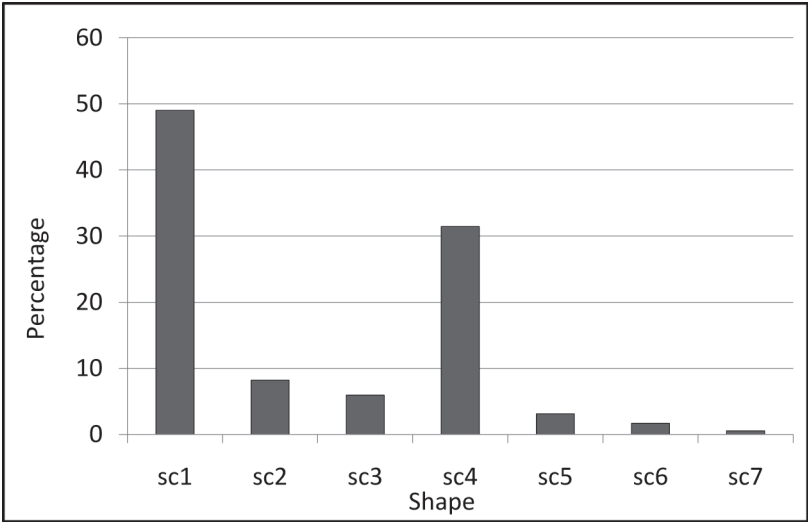


Figure 25. Percentage frequencies of shapes from Late Sheikh Muftah sites.

and 32k); medium-sized vessels from subclasses 1, 2, 4 and 5 (Pls 30j, 11b, 28n, 32a, f and h); and large vessels from subclasses 1, 2, 3 and 4 (Pls 31c, 34i, 31j, 29f and 13d). A perforated disc produced from the Hp1 ware has also been recorded (Pl. 34h).

Eighteen examples of the Hx1 ware were recorded as medium-sized or large vessels with shapes from subclass 1 (Pls 9c–d, 13o and 34d), subclass 4 (Pls 10m, 14a, 24b, 29h and 34e) and subclass 5 (Pls 11r and 35j). Three examples of the Hm1 ware were recorded, one of which has a subclass 4 shape (Pl. 11o); along with two examples of the Hc1 ware, one with a subclass 1 shape (Pl. 29j); one example of the Hmx1 ware with a subclass 4 or 5 shape (Pl. 11t); and one example of the Hd1 ware from Loc. 134, described above.

The 1B fabric is slightly more common in frequency and has a wider distribution. This fabric is found with plain (Hp2), compacted (Hm2), coated (Hc2), textured (Hx2), and textured-and-decorated (Hxd1) treatments. The Hp2 ware is particularly common (Fig. 26) and having been recovered from 28 sites, is most responsible for the Late Sheikh Muftah site similarities determined through the SIMPER analysis (Table 9). The range of forms for the Hp2 ware are extensive. Also associated with this ware are six perforated discs (Pls 10q, 11j, 12r, 13a, 22o and 29c), a truncated cone (Pl. 15g) and token-shaped and spoon-shaped objects (Pl. 23a and k). It is worth mentioning that five of the seven scrapers found in the collection are worn versions of Fabric 1B (Pls 23f–h and 34b). The shapes and sizes associated with this ware include small versions of the subclass 1 and 2 (Pls 17l–m, 10g–h and 13g) and subclass 4 and 5 (Pls 10i, 18g–h, 11h, 25g and 35e); medium-sized versions of subclass 1 (Pls 10f, k, 11d and k), subclass 2 (Pls 11g and 35b), subclass 3 (Pl. 18a) and subclass 4 (Pls 9b, 10c, l, 24a and 28g) vessels; and large versions of the subclass 1 (Pls 11c, 15j, 32s and 33d), subclass 2 (Pl. 17p–q), subclass 3 (Pl. 18b and f) and subclass 4 (Pls 14m, 18n and 33e) vessels.

Twenty-seven examples of the Hx2 ware were recovered from 13 sites. Shapes found in association with this ware are mostly from subclass 1, examples of which are medium-sized (Pl. 22g and i) or large (Pls 9e, 14b, 22f, h, 25b and 27b). An example of a scraper was also found with this ware (Pl. 23e). Two examples of the Hc2 ware were found, one of which has a subclass 1 shape (Pl. 36b), and an example each of the Hm2 ware with a subclass 4 shape (Pl. 12p) and the Hxd1 ware.

The 1C fabric constitutes around 12 per cent of the collection and is found with plain (Hp3), compacted (Hm3) and textured (Hx3) treatments. The most common of these is the Hp3, and with 68 examples found on 17 sites it is one of the four wares driving site similarities in the SIMPER analysis (Table 9). Most of the shapes found with this ware come from subclass 1, and most of these are medium-sized (Pls 13i, 15h, 19a, 25h, 28o, 33h and 35g) or large (Pls 13j and 19d–k). A few examples with subclass

2 and 3 shapes (Pls 19m–p and 20a–c) were recorded along with several examples with subclass 4 shapes, most of which were medium-sized (Pls 20g, 25a, 28p–q and 35h) or large (Pls 15b, 20e, h, 33k and 35i). A disc was also recorded with the Hp3 ware (Pl. 13b). Additionally, in this collection is one example of the Hm3 ware, along with eight examples of the Hx3 ware with shapes from subclasses 1 (Pls 13c and 36a) and 4 (Pl. 25d).

The remainder of this Fabric Family includes 13 examples of the 1D fabric and three examples of the 1E fabric. Most of the Fabric 1D sherds do not preserve treatment. The exceptions are an example each of the compacted (Hm4) and coated (Hc3) wares, and four examples of the plain ware (Hp4), one of which is a disc (Pl. 10r) while two others possess subclass 1 shapes (Pls 11e and 33l). The Fabric 1E examples are plain (Hp5) and coated (Hc4).

All four ‘shale-rich’ fabrics were recovered from Late Sheikh Muftah sites. Combined, these form around 15 per cent of the collection. Ten examples of the 2A fabric were recovered from five sites. While these are mostly plain (Hp6), two compacted versions (Hm5) were recovered. Shapes associated with the Hp6 ware include examples from subclasses 4 and 6 (Pls 20i and 10j). Fifty-six examples of the 2B fabric were recovered: these are compacted (Hm6) or plain (Hp7). Shapes associated with the Hm6 ware include examples from subclass 1 (Pl. 21l–o), subclass 3 (Pl. 22a) and subclass 4 (Pl. 22b–d). This ware is also associated with a spoon-shaped object (Pl. 23j) and a perforated disc (Pl. 22p). The Hp7 ware appears mostly in the form of small or medium-sized vessels with subclass 1 (Pl. 20j–l, n), subclass 4 (Pl. 20o–r), subclass 5 (Pl. 20s–t) and subclass 6 (Pl. 20u) shapes. Two spoon-shaped objects (Pl. 23i and l) and a token-shaped object (Pl. 23b) were also found in association with this ware.

Thirty-seven examples of the 2C fabric were recovered. Most of these are plain (Hp8) with shapes from subclass 1 (Pl. 29l) and subclass 4 (Pls 21a–b and 34f). A few compacted versions of this fabric (Hm7) have been found, one of which preserves a subclass 4 shape (Pl. 11q), plus the only example of the compacted-and-textured version of the ware (Hmx2), which bears a subclass 1 shape (Pl. 24c). Two examples of the 2D fabric were found, both plain (Hp9), and one with a subclass 6 shape (Pl. 21c).

Three of the six ‘sand’ fabrics are present in this collection. The 3A fabric is the most common with 14 examples. One of these is textured (Hx4) with a subclass 1 shape (Pl. 14d) while 11 others are plain (Hp10). Shapes associated with the Hp10 ware come from subclasses 1, 2 and 4 (Pls 28i, 33m–n, 14c and 33o). Fabrics 3B and 3F are represented by one example each, the latter of which was recorded with a plain surface treatment (Hp13) in the form of a spoon-shaped object (Pl. 23m).

Five fabrics from Fabric Family 4 were recorded in the Late Sheikh Muftah collection (Fig. 23). The count includes three examples of the 4A fabric, two of which

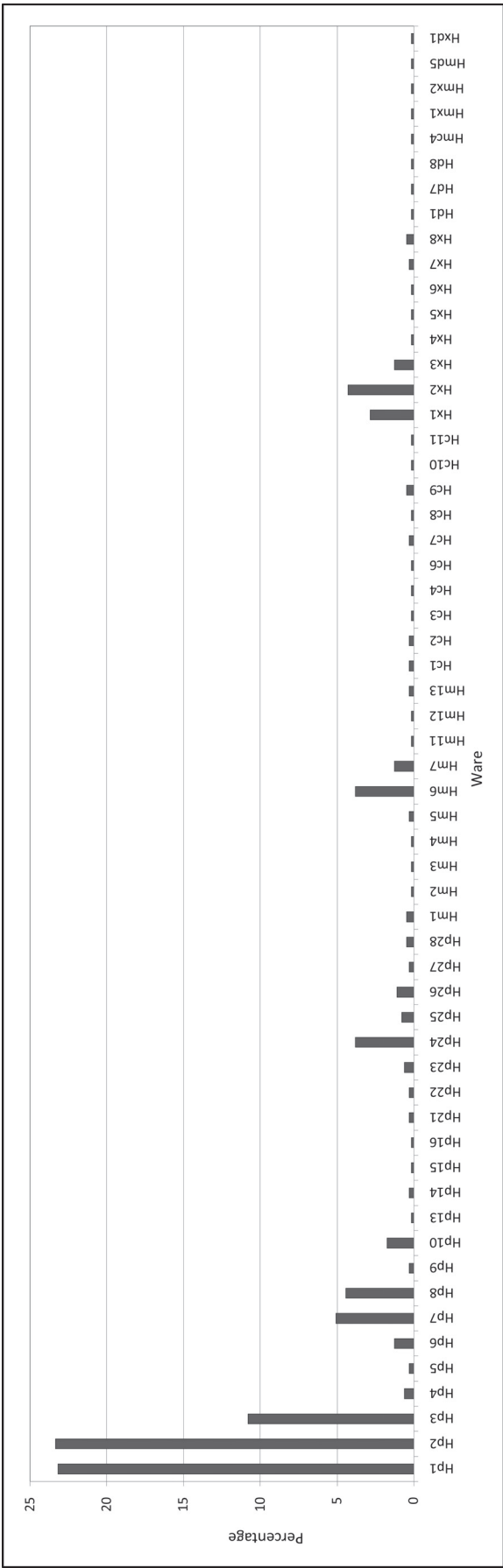


Figure 26. Percentage frequencies of wares from Late Sheikh Mufiah sites.

are plain (Hp14) while the other is coated (Hc6) and has a subclass 6 shape (Pl. 22n); one example of the 4B fabric which is plain (Hp15); four examples of the 4C fabric, two of which are coated (Hc7) and another plain (Hp16); three examples of the 4E fabric, one of which bears a compacted-and-decorated (Hmd5) surface treatment; and one example of the 4G fabric which comes in the form of a truncated cone (Pl. 29b).

Examples from Fabric Families 5 and 6 may be discussed together here as they form only a handful of finds (Fig. 23). Fabric Family 5 is represented by only two finds, both of which are examples of the 5B fabric. One of these is coated (Hc8) with a subclass 1 shape (Pl. 29k), and the other is compacted-and-coated (Hmc4) with a subclass 1 shape (Pl. 29i). Fabric Family 6 is represented by five finds, two of which are plain examples of the 6A fabric (Hp21), while the other three are examples of the 6B fabric, two of which are plain (Hp22) with subclass 2 and 4 shapes (Pls 12b and 34g).

All three fabrics from Fabric Family 7 are represented in this collection. While these do not compare in quantity to the sand-and-shale or shale-rich fabrics (Fig. 23), they are reasonably well represented with 48 examples found on 17 sites. Seven examples of the 7A fabric have been recovered. Four of these are plain (Hp23) with shapes from subclasses 1, 3 and 4 (Pls 26a, 25e and 14h), while the remainders are compacted (Hm11), textured (Hx6) with a subclass 1 shape (Pl. 22l), and decorated (Hd7) with a subclass 3 shape (Pl. 14e). Thirty examples of the 7B fabric were recovered. Most of these are plain (Hp24) with shapes from subclass 1 (Pl. 21e), subclass 2 (Pl. 21f–g), subclass 3 (Pls 12c and 21h–i) and subclass 4 (Pl. 15i); one example of the Hp24 also appears in the form of a scraper (Pl. 23d). Other versions of the 7B fabric include a compacted example (Hm12) with a subclass 1 shape (Pl. 11p) and two examples of the Hx7 ware, one of which has a subclass 3 shape (Pl. 22m). Eleven examples of the 7C fabric appear in the collection: five of which are plain (Hp25) with subclass 1, 2 and 3 shapes (Pls 26b, 21j–k and 14i); two are compacted (Hm13), one with a subclass 4 shape and the other a subclass 6 shape (Pl. 11i); and three are textured (Hx8), one with a subclass 1 shape (Pl. 14j).

The 8A, 9A and 9B fabrics may also be discussed together. Sixteen examples of the 8A fabric were found on eight sites (Fig. 23). While the preservation of these finds is generally poor, seven appear to be plain (Hp26) and three are coated (Hc9). None of these offer shape diagnostics, although an example no longer preserving surface treatment has a subclass 7 shape (Pl. 11f). Six examples of the 9A fabric were recovered: two are plain (Hp27) and another coated (Hc10). An example of the 9A fabric no longer bearing surface treatment has a subclass 7 shape (Pl. 30a). Only one example of the 9B fabric has been found and this bears decoration (Hd8). Lastly, five examples of the 9C fabric have been recovered. Three of

these are plain (Hp28) and another is coated (Hc11) with a subclass 1 shape (Pl. 34a).

In summary, the Late Sheikh Muftah pottery collection is notable for its extensive range of material, within which some important patterns may be determined. The collection is driven principally by two sets of fabrics (1A–C and 2B–C, and to a lesser extent 7A–C), three surface treatments (plain, compacted and textured) and two shape subclasses (1 and 4). Some recurring combinations of properties are worth noting.

The 1A–C fabrics are typically found with plain or textured surface treatments and the full range of shapes. Vessels are mostly medium-sized, though it is not uncommon to find both small and large examples as well. Generally speaking, the wall thickness of this material ranges 5.0–8.0 mm nearing the rim and thickens towards the base. The surfaces are often uneven and coarse to touch, even those that were smoothed during construction, rims tend to undulate, and there is a notable lack of symmetry in vessel forms: a similar description befits other locally-made material in the Late Sheikh Muftah collection, such as the Fabric 7A–C examples. Yet within the collection there also exists examples of the 1A–C fabrics used in the construction of small, symmetrical vessels with thin walls and even, smoothed surfaces much like the Bashendi pottery.

The 2B and 2C fabrics are generally plain or compacted and associated mostly with shapes from subclasses 1 and 4. The size of the vessels can be small, medium or large. The 2C examples tend to be more robust, fitting the description noted above for other locally-made pottery, while the 2B examples often have even and thin walls (3.5–6.0 mm) and compacted surfaces, and seem to have been used in the production of smaller vessels.

It is important to recognise within this brief characterisation the production of both finely made and roughly made pottery. The latter, which is more common, appears to have been hastily constructed perhaps with the expectation of breakage through rigorous use. The finer material appears to have involved increased time/effort investments in production, particularly in the case of the 2B examples with the thinness and evenness of walls and smoothness of surfaces. This apparent dichotomy in production indicates an increasing diversity in vessel use during the later Late Sheikh Muftah period.

The final remark on the Late Sheikh Muftah is reserved for Locs 136 and 404 since both sites yielded material from sub-surface deposits (McDonald *et al.* 2001). In analysing the material from these sites, an attempt to identify differences between surface and sub-surface finds was undertaken in the interests of differentiating trends within the Late Sheikh Muftah period. In the case of Loc. 136, the sub-surface material was much the same as that which appeared on the surface. With the exception of one fabric (1E), which is anomalous within the Dakhleh collection, all other examples from excavated deposits

(Fabrics 1A–C, 2A, 2C and 7B) can be found in the surface collection. As these fabrics are the most common on Loc. 136 a meaningful pattern could not be demonstrated between the surface and subsurface material.

This is much the same for Loc. 404, and it comes as no surprise that the majority of sub-surface finds are the 1A and 1B fabrics. These appear in almost identical frequencies as they do in the surface collection. While several other fabrics (2C, 3A and 9A) also appear in similar frequencies from both contexts, examples of the 2A–B, 6B and 7B fabrics are recorded only in the sub-surface collection. It is noteworthy that these fabrics are recorded from surface contexts on Loc. 136, which could suggest that Loc. 404 is younger than Loc. 136 – assuming that the use of the 2A and 2B fabrics was uniform across the oasis in time. This is recognised as a fairly tenuous point, and does not find support in the position of these sites on the ware scattergram (Fig. 7a–b).

4.7 Handmade pottery from sites that are not registered on the Holocene prehistory index

The small collection of handmade pottery recovered from Locs 005, 012, 028 and 131 is included in the quantification even though these sites do not belong to the Masara, Bashendi or Sheikh Muftah cultural units – Loc. 005 is registered as a Pleistocene site, whereas Locs 012, 028 and 131 are all historic period sites (Churcher 1999a).

The finds from Locs 028 and 131 are examples of the Hp1, Hp6 and Hp8 wares with relatively thick walls, and uneven and rough surfaces. There is little doubt these examples are the product of the Late Sheikh Muftah tradition, even if the position of Locs 028 and 131 on the MDSCAL scattergram (Fig. 7a–b) is slightly peripheral to the main Sheikh Muftah cluster.

The single find from Loc. 012 is classified as a 2C fabric, but it is a particularly coarse example. In terms of texture and the size and distribution of inclusions, as well as the wall thickness (>8.0 mm), it compares well with the extremely coarse shale pottery recovered from Old Kingdom sites in the oasis (see for example Hope *et al.* in press) and should probably be considered a product of this industry. This conclusion is supported by the fact that Loc. 012 is registered as an Old Kingdom site (Churcher 1999a).

The single rimsherd from Loc. 005 is harder to categorise being the only example of the Hmd4 in the collection. While the combination of fingernail incisions and compacted surfaces has been recorded from the Bashendi B site 212 and Late Sheikh Muftah site 059, in neither case do these resemble the current example in decoration or fabric. Hope (2002, 51) has compared this find with A-Group examples (also section 6.1), which would suggest a Late Sheikh Muftah deposition date.

4.8 Handmade pottery from findspots

The pottery from four of the five findspots (FS4, FS5, FS8 and FS9) compares closely with the Late Sheikh Muftah

material. The perforated disc from FS5 (Pl. 36i) shares the same general form as all others from Late Sheikh Muftah sites, and the Hx1 and Hx2 wares from FS4, FS8 and FS9 also compare in fabric, wall thickness, texture and form to material from Late Sheikh Muftah sites. This is reflected by the overlapping positions of FS8 and FS9 on the MDSCAL scattergram (Fig. 7a–b), and to some extent the position of FS4.

The four sherds from FS1 are harder to place as these are the only examples of the Hd5 ware in the collection. It is noteworthy that the findspot sits on the eastern edge of a small basin only 400 m east of the extensive Loc. 136 (Fig. 18). By virtue of proximity, FS1 may be related to this site and the unusual fabric and decoration suggest this find is probably an import (section 6.1).

Notes

- 1 Factors influencing site collection strategies include the size of the site, the distribution of artefact concentrations, and the usual time and logistical constraints that go hand-in-hand with fieldwork. The result is that several sites have been intensively surveyed, plotted, surface collected and excavated, whereas others have received only cursory attention. With a few exceptions, the Sheikh Muftah sites fit the latter description. On several occasions the collection strategy could best be described as ‘opportunistic sampling’ with a selection bias towards rimsherds, or if these were not available, well-preserved sherds in excess of 1.5 cm². While this is not the preferred method of collection, it is necessary given the number and size of Sheikh Muftah sites. It also ensures that at least a portion of the site’s artefact population is added to the overall pottery count, even if the sites themselves have not yet been fully investigated.
- 2 The MDSCAL works off a similarity matrix (described in the main text) in which the similarity/dissimilarity between samples, in this case sites, is calculated on the basis of their constituent variables (e.g. fabrics, wares, etc.). This is done for every combination of two samples (sites) and the resulting ‘pairwise comparisons’ form the basis of the matrix. While the matrix is useful for observing similarities/dissimilarities between individual samples, it is difficult to conceptualise or interpret as a whole, given the amount of data. The MDSCAL is used at this point to assist in the interpretation. It begins by randomly selecting a sample, then finds the most similar sample to this, and the most similar sample again, and plots these in multi-dimensional space: the process of rank-ordering continues until all samples have been plotted in succession. The entire procedure is then repeated until the most efficient layout – the minimal distance between all samples – is discovered. For presentation purposes, the MDSCAL then sets about reducing the number of dimensions from four to two. This often sees slight shifts in the distances between samples which is reflected in the stress levels (see Shennan 1997, 348–9) – a stress level above 0.2 is generally considered unreliable for interpreting the plot (Clarke 1993, 125–6). The final output is a two-dimensional scattergram in which the distance between samples is a reflection of the similarities/dissimilarities among their variables. Put

simply, the closer two samples are on the scattergram, the more variables they share.

- 3 This software was developed specifically for ecological data and to my knowledge it has not been applied to any archaeological data. It was applied here simply because it was 'user-friendly' and available. The computations should not differ substantially, if at all, from those in programs used more frequently in archaeology (e.g. MV-ARCH).
- 4 The Primer5 software does not allow variables (Loc. number) and factors (sub-unit) to be combined on a single scattergram. As such, the same results had to be presented twice for each of the four MDSCAL analyses: the first graph of the paired scattergrams (Figs 4a; 5a; 6a and 7a) identifies sites by the symbol associated with their factor group (i.e. sub-unit), while the second graph (Figs 4b; 5b; 6b and 7b) identifies the same sites by locality number.
- 5 The reader is advised when reading the maps (Figs 2, 8, 11 and 18) that single dots in some instances represent two or more localities that are closely spaced on the ground.
- 6 Localities 076, 218, 224, 243 and 259 belong to the Masara Variant A and Loc. 200 to Variant B. Pottery has not been recovered from Masara C sites.
- 7 This count includes the remains of an Islamic vessel removed from the analysis.
- 8 It is important to note that much of this work took place after Hope's (2002) paper was published. When presented with the

new findings Hope (pers. comm., 2004) agreed that a revision of his original assessment was necessary, and encouraged clearing up the matter with a publication (i.e. Warfe 2006).

- 9 Research on a final or 'Terminal' Sheikh Muftah phase is currently in progress focussing on material recovered from the site of Mut al-Kharab (Warfe 2005; 2008, 36; Hope and Pettman 2012; Hope *et al.* in press; also Chapter 1, note 5). The lower levels of the site represent a possible co-occupancy by Sheikh Muftah indigenes and Nile Valley colonists, and the material by-product is being examined for signs of cultural admixture. Once complete, the results of the analysis will be considered alongside the current study for future publications.
- 10 Hope (2002, 46) mistakenly identified pottery labelled 31/420-C10-1 with Loc. 118 rather than Loc. 073, to which this index number correctly belongs. The pottery was reanalysed in the current study as part of the Loc. 073 site collection. As a consequence, Loc. 118 is treated as an aceramic Sheikh Muftah site herein, and Loc. 073 is looked upon as a potential Early Sheikh Muftah site.
- 11 From the appendix this includes Locs 002, 008, 047, 048, 059, 062, 064, 068, 069, 070, 071, 073 (see note 10 above), 088, 093, 094, 096, 098, 100, 105, 108, 109, 114, 115, 117, 119, 134, 136, 139, 143, 144, 145, 168, 169, 170, 171, 220, 222, 244, 250, 365, 380, 382, 388, 402, 404 and 406.
- 12 The list is the same as note 11 above, with the removal of Locs 073, 139 and 220, and the addition of Locs 072, 138 and 221.

Chapter 5

Long-term change in the ceramic record

Charting the ceramic developments in Dakhleh during the mid-Holocene period reveals two broad traditions: these are attributable to the Bashendi and the Sheikh Muftah cultural units. The pottery from the Masara sites, findspots and Locs 028 and 131, 401, 407, 409, 420, 422 and 423 is incorporated into this overview now that the material has been assigned to one of the Bashendi sub-units or Sheikh Muftah phases.¹ Also included is the ceramic material that was possibly imported, rather than locally-made. Although this is not desirable when examining changes in the local industry, in several instances the provenance is not certain.

Long-term variation in the ceramic record is gauged through the quantity of material produced, shifts in the standard of manufacture, and the frequencies in which fabrics, surface treatments and shapes occur. Beginning with the overall quantity of material, it is clear that there was a gradual increase in the amount produced over time. For the most part this appears to be a steady increase – there are only a few sites from each unit that yield an unusually high quantity of material, and even then, these may have been occupied for some time. Notwithstanding, Bashendi A sites tend to yield the remains of less than five vessels, whereas this number is slightly higher for Bashendi B sites and greater still for Sheikh Muftah sites. To offer a quantifiable indication of this increase, the temporal spans (in radiocarbon years) for the Bashendi A and B sub-units and the combined Early and Late Sheikh Muftah phases² have been divided by the number of finds from sites. On average, the Bashendi A potters produced one vessel every 35 years, while the Bashendi B produced a vessel every 11 years, and one vessel was produced every one and a half years by the Sheikh Muftah potters. Of course, it is problematic to argue that a technology could continue with such large intervals between production. The example is included only to give a general sense of the increased scale of production over time.³

Some useful observations may also be offered on shifting standards of manufacture, despite it being a more

subjective measure for gauging variation. Considerable effort appears to have been invested in the production of the Bashendi pottery. This may be deduced from the symmetry of the vessel form, the straightness of the rim, the smoothness and evenness of the surfaces, the uniform wall thickness which gradually increases towards the base, and the elaborateness of decorative motifs. Most of these features demonstrate labour expenditures in finishing the vessel that go well beyond the requirements in producing a watertight container, if indeed this was the primary function. While these production values continued into the Sheikh Muftah period, there is also an apparent shift in production values highlighted by numerous vessels that exhibit a lack of symmetry in form, undulating rims, unevenness in wall thickness, surfaces that are coarse to touch and with texturing applied in a haphazard manner. Outwardly, such features might imply that less effort was invested in producing the bulk of Sheikh Muftah pottery, but care must be taken in treating this as a decline in craft expertise. The shift to more crudely produced vessels could be related to matters of production efficiency or intended function, pointing to new and emerging pressures on the industry (Warfe 2015; 2016).

As fabric, surface treatment and shape data have been submitted to statistical analysis, these too are instructive for gauging long-term change in the ceramic record. The following comparisons of Bashendi A/B and Early/Late Sheikh Muftah collections indicate emerging patterns of ceramic development across the mid-Holocene period.

5.1 Summary of fabrics

The strongest patterns in the fabric data are formed by the 1A–C, 2A–C fabrics and, to a lesser extent, the 5A–B and 7B–C fabrics. To appreciate these patterns it is important to look first at the fabric development in the collection. The Bashendi A collection reveals only nine of the 33 classified fabrics. This figure increased during the Bashendi B (16 fabrics) and Early Sheikh Muftah (14

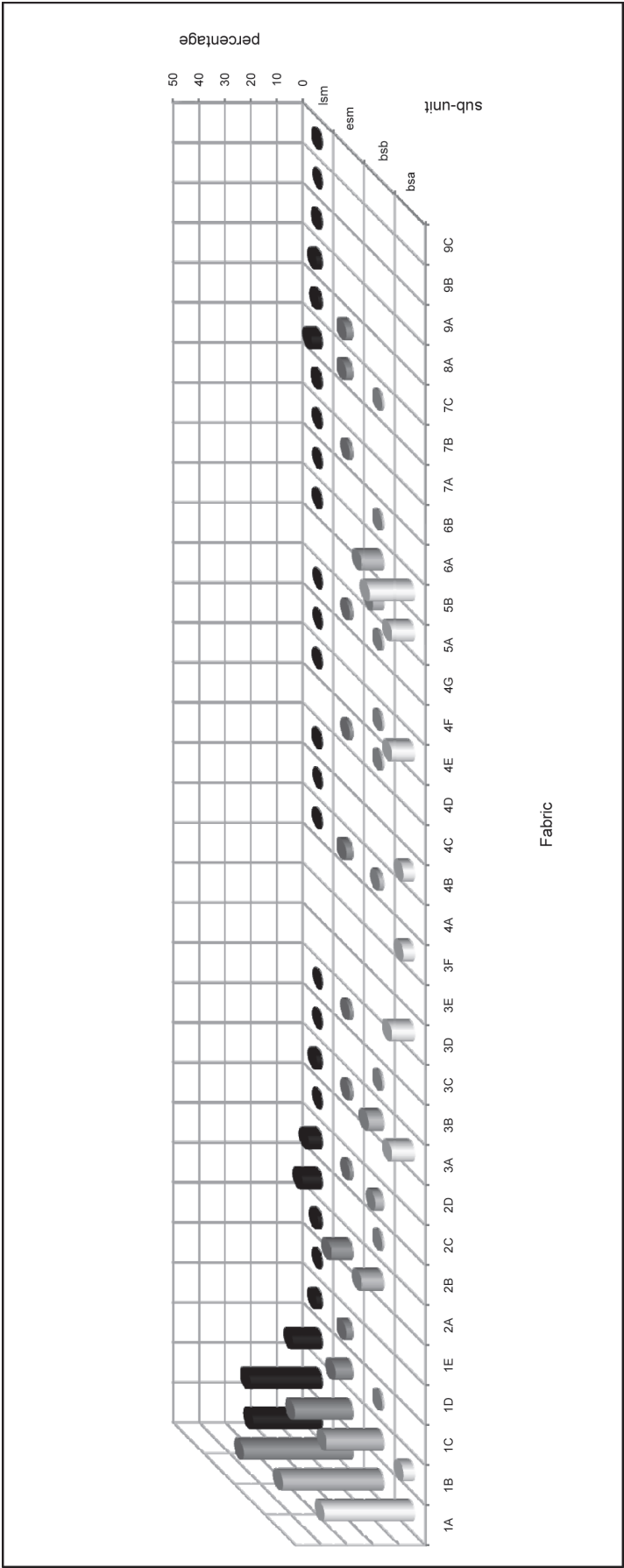


Figure 27. Percentage frequencies of fabrics from Bashendi A/B and Early/Late Sheikh Muftah sites.

fabrics) periods to reach 28 fabrics for the Late Sheikh Muftah. Even if the suspected non-local fabrics 3D–E, 4G, 6A–B, 8A, 9A–B (section 6.1) are removed from these tallies, there is still a notable growth in the range of material produced from the Bashendi A onwards (Fig. 27).

Fabrics that occur infrequently cannot be used to pattern the collection, though are important in demonstrating variation in the record. More than a third of the fabrics fall into this category, including the 1E, 2D, 3C, 3E, 4C, 4F, 6A–B, 7A, 8A and 9A–C fabrics. The 3E fabric recovered from the Masara site 076, and most likely an early Holocene import (Warfe 2006), should immediately be removed from discussion as it does not appear in either the Bashendi A/B or Early/Late Sheikh Muftah collections, hence its absence from Figure 27. The 6A–B, 8A and 9A–C fabrics should also be removed on the grounds they are most likely imports (Chapter 6), while the remaining 1E, 2D, 3C, 4C and 7A fabrics are worth highlighting simply because these are variations of the more common local fabrics. The 4F fabric may also be an anomalous locally-made product.

Other fabrics, specifically the 2A–C, 5A–B and 7B–C examples, appear in greater numbers and are distributed across the Bashendi and Sheikh Muftah collections. All examples of the 5A fabric, and most examples of the 5B fabric were recovered from Bashendi A and B sites. Although both fabrics increase slightly in number from the earlier to later phase, the respective percentage values show a decrease. In any case, these closely related fabrics are confined mostly to the Bashendi period, and notwithstanding three examples found on Late Sheikh Muftah sites, apparently fade out during the latter stages of the mid-Holocene period. By contrast, the 2A–C fabrics emerge during the Bashendi B and become more frequent by Late Sheikh Muftah times. A similar pattern exists with the 7B–C fabrics, though slightly later in time.

The only fabrics recorded across all four collections are the 1A, 1B and 3A fabrics (Fig. 27). Examples of the 3A appear in small frequencies and cannot really be used as indicators of strong on-going trends. The 1A and 1B fabrics, however, dominate three of the four collections. Combined, they constitute 55 per cent of the entire pottery assemblage – the figure increases to 65 per cent when the closely related 1C fabric is added to the count. The frequencies in which each of the fabrics appear is also significant. The 1A–C fabric data were scrutinised separately from the other fabrics and a distinct pattern emerged once these data were graphed (Fig. 28). Despite the initial increase in the 1A fabric, the trend line indicates a gradual decline across the four periods, whereas the 1B and 1C fabrics maintain an increase throughout. But care must be taken in reading this pattern, as the Fabric 1A is still common in the Late Sheikh Muftah collection despite an increase in the production of coarser fabrics.

Although this conclusion is based on selected examples, it is notable that several other fine fabrics (5A and 5B) appear predominantly in the Bashendi collections, whereas coarser fabrics (2B and 2C) appear predominantly in the Sheikh Muftah collections. Of course, there are exceptions to the rule and coarse fabrics (e.g. Fabric 3D) are predominant or exclusive to the Bashendi A/B collections, whereas finer fabrics such as the 2A, 4A, 8A, and 9A–B fabrics are more frequent in the Sheikh Muftah collections, even if some of these are probable imports (e.g. 3D, 8A, 9A–B fabrics). The 7A–C fabrics that are essentially a feature of the Sheikh Muftah tradition are difficult to classify as either fine or coarse.

5.2 Summary of surface treatments

The surface treatment data present a similar picture in that the range of treatments steadily increases from the

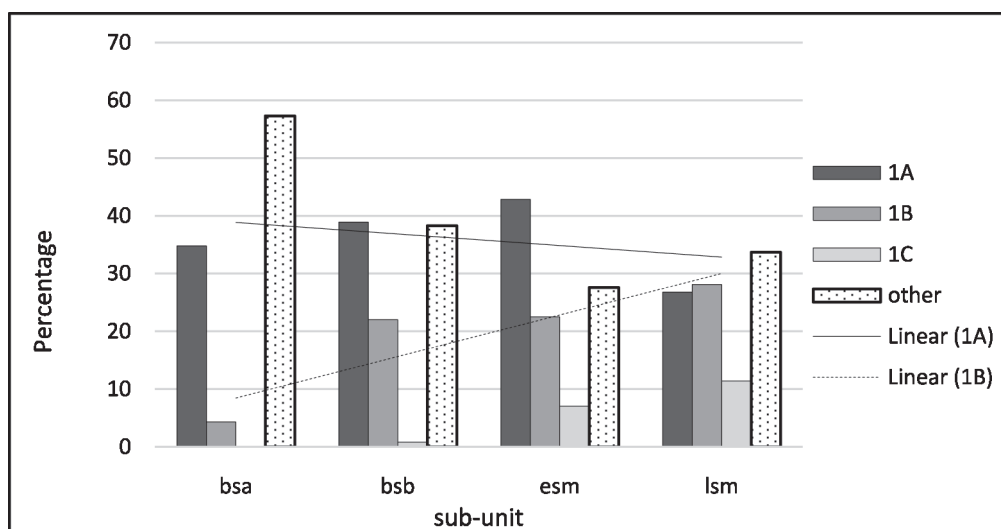


Figure 28. Percentage frequencies of 1A–C fabrics from Bashendi A/B and Early/Late Sheikh Muftah sites.

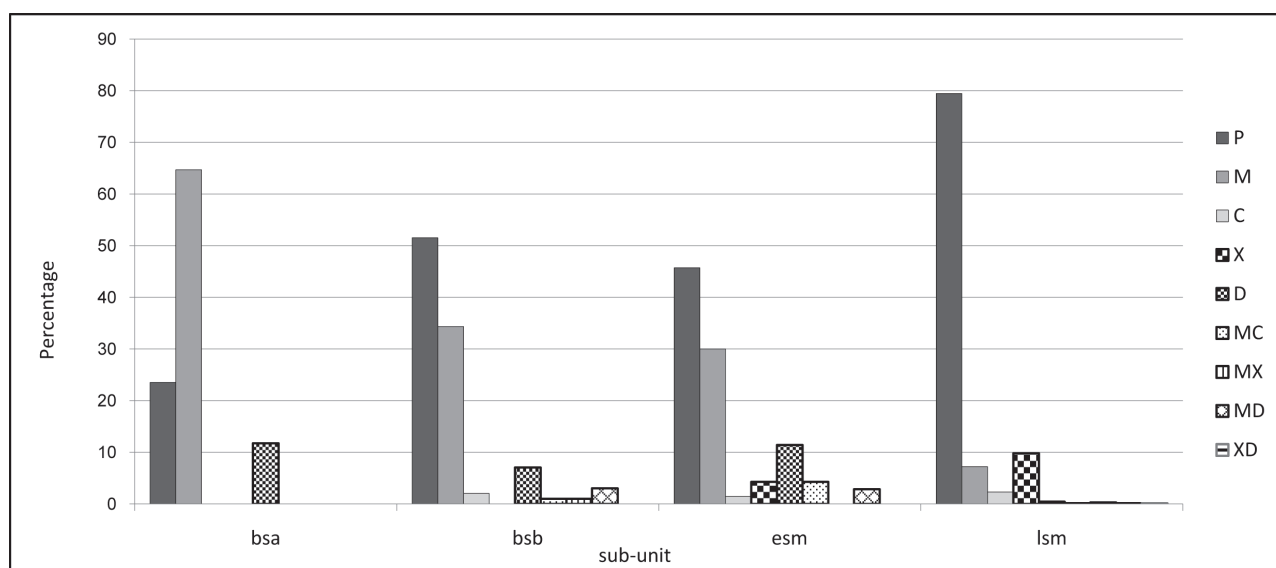


Figure 29. Percentage frequencies of surface treatments from Bashendi A/B and Early/Late Sheikh Muftah sites.

Bashendi A onwards (Fig. 29). The frequencies in which these appear form several interesting patterns. The most obvious relates to the plain and compacted treatments, which when combined form between 75 per cent and 90 per cent of each collection. These treatments can be discussed together as they form an inverse relationship in which the initial preference for compacting surfaces soon gave way to leaving the surface plain.⁴

The use of coatings develops with the Bashendi B and while there is an increase in the Early/Late Sheikh Muftah collections, the overall percentage values of this treatment remain relatively static across time. Texturing first appears in the Early Sheikh Muftah collection – notwithstanding an example of the compacted-and-textured treatment in the Bashendi B collection. Despite being a late addition to the pottery industry, this treatment increases in frequency over time to outnumber compacted surfaces.

In terms of decoration, the graph (Fig. 29) is slightly misleading as it gives the impression that this treatment was relatively constant across the Bashendi A, Bashendi B and Early Sheikh Muftah collections. In fact, only two examples are present in the Bashendi A collection, whereas several more were recorded from the Bashendi B and Early Sheikh Muftah collections. As the two Bashendi A examples are almost certainly imports (section 6.1), the local examples represent an ephemeral trend that seems to have reached its peak some time around the Bashendi B/Early Sheikh Muftah overlap.

5.3 Summary of vessel forms: shape and size

In discussing vessel form the reader is reminded that relevant data were unobtainable from the Bashendi A collection. The range of vessel shapes recorded for the Bashendi B and Early/Late Sheikh Muftah collections is roughly the same (Fig. 30). In examining each of the

shape subclasses individually, several different patterns emerge from the data. The most striking of these is the predominance of vessels from subclasses 1 and 4, which together comprise 60 per cent to 80 per cent of each collection.

It is notable that while both shape subclasses appear in similar numbers in the Bashendi and Early Sheikh Muftah collections, the subclass 1 examples begin to increase in frequency over time, whereas the subclass 4 examples remain relatively constant in percentage. The percentages of other shape subclasses do little to elaborate on this pattern: shape subclasses 6 and 7 decrease in frequency over time, shape subclass 2 increases at first but then decreases, and shape subclasses 3 and 5 demonstrate the inversion of this pattern. More sense can be made of this spread once the data are collapsed into the broader unrestricted (subclasses 1, 2 and 3) and restricted (subclasses 4, 5, 6 and 7) classes (Fig. 31). In the Bashendi B collection the unrestricted and restricted classes are recorded in similar numbers, but the division becomes more pronounced in the Early and Late Sheikh Muftah collections as restricted shapes give way to unrestricted shapes.

A clear pattern may also be observed with the data compiled on vessel size (small, medium and large) for the Bashendi B and Early/Late Sheikh Muftah collections (Fig. 32). While medium-sized vessels appear in relatively similar percentages across the Bashendi and Sheikh Muftah collections, an inverse relationship exists between the small and large vessels. Roughly 40 per cent of the Bashendi B collection are small vessels, whereas no large vessels were recorded. Once large vessels start to be produced in the Early Sheikh Muftah, they become increasingly numerous and are eventually recorded in greater numbers than the small vessels.

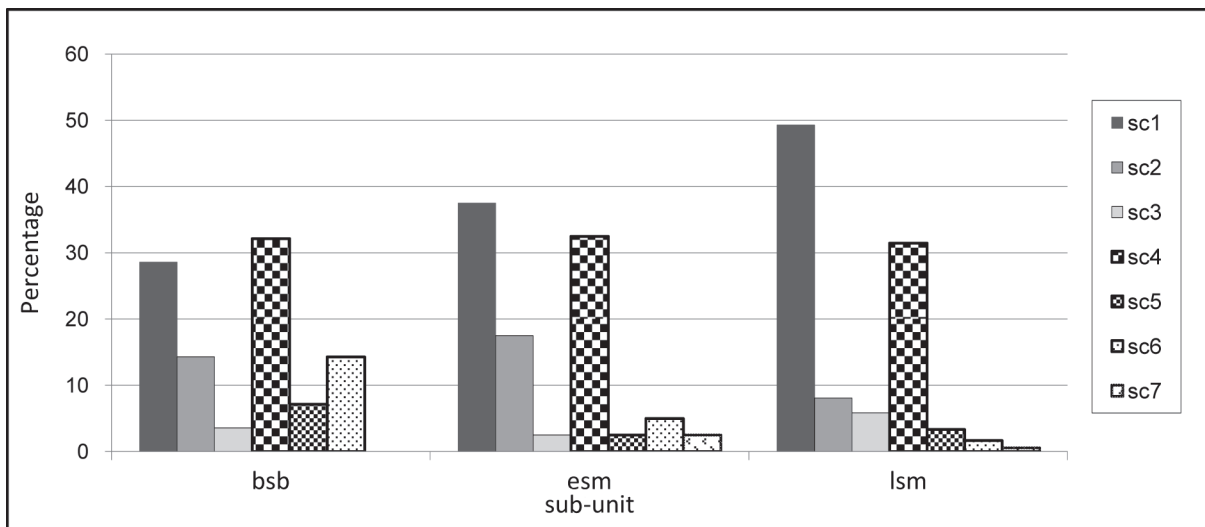


Figure 30. Percentage frequencies of vessel shape (subclass) from Bashendi B and Early/Late Sheikh Muftah sites.

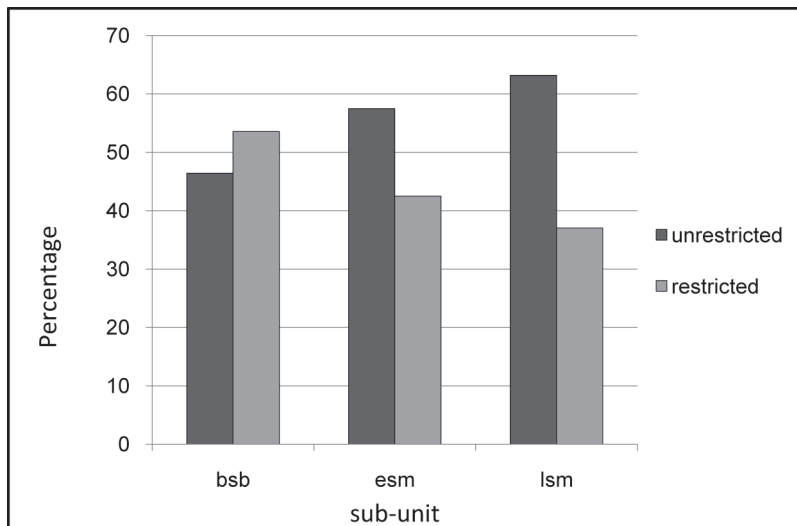


Figure 31. Percentage frequencies of vessel shapes (unrestricted and restricted) from Bashendi B and Early/Late Sheikh Muftah sites.

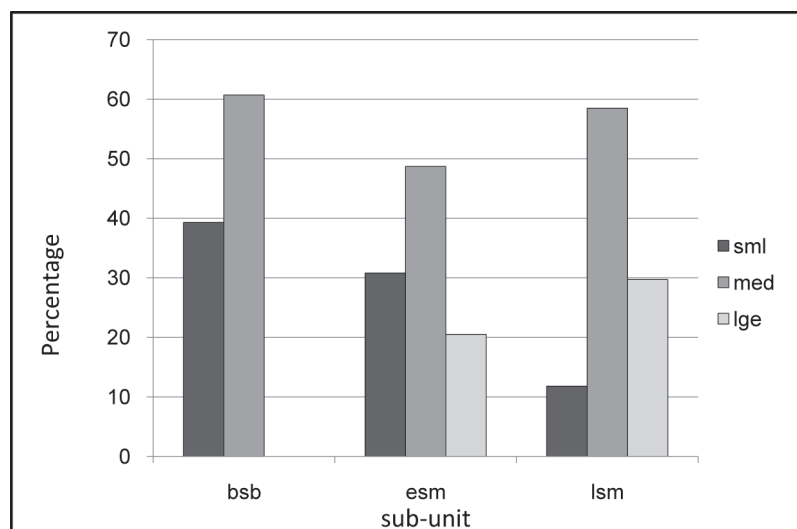


Figure 32. Percentage frequencies of vessel size from Bashendi B and Early/Late Sheikh Muftah sites.

The final set of data to comment on in relation to shape/size is the miscellaneous objects. These are clearly a late development in the pottery tradition with most examples coming from Late Sheikh Muftah sites. Exceptions to this include a truncated cone and four perforated discs from the Early Sheikh Muftah site 135. These were compared with examples from Late Sheikh Muftah sites to determine any temporal difference in form or ware, but no obvious patterns could be established. The cone is produced from the same fabric and surface treatment (Hp2) as two of the three Late Sheikh Muftah cones and has matching dimensions. The discs from Loc. 135, as with those from Late Sheikh Muftah sites, are produced from Hp2, Hp3 and Hp4 wares, which is not surprising given that all but one of these objects are worked from existing vessels. The dimensions of the Loc. 135 discs also match. The radius of the outer and inner diameters fit neatly within the range of recorded discs from the collection.

5.4 Comments on ware and shape cross-tabulation

As a final analysis, the ware and shape data were cross-tabulated to identify any recurring patterns. This was an exhaustive task and the results are not particularly instructive. In total, there were 415 instances in which shapes could be matched with wares, and these collapsed into more than 100 ware-shape combinations. Over half the combinations, 55 to be exact, occurred once only and will therefore not be discussed. A further 28 occurred less than five times, and only eight were recorded more than 10 times. As expected, the most common combinations were those involving Hp1, Hp2, Hp3 and Hp2 wares and subclass 1, 2 and 4 shapes. The Hp7, Hx1, Hm1 and Hm6 wares also featured prominently with subclass 1 and 4 shapes.

The problem with using these results is that the patterns are less robust than they might seem when taking into account vessel size and individual shapes within the overall shape subclass. For example, the most frequent ware-shape combination is the Hp1/subclass 1 combination, of which there are 46 examples forming roughly 11.5 per cent of the overall count. However, only a few of these examples are closely matched in terms of form: compare, for instance, an example of a deep, medium-sized Hp1/subclass 1 vessel (Pl. 14g) against a large shallow version (Pl. 34i), or a small, shallow version (Pl. 28m). To wit, it remains unclear whether the potters intended to match specific shapes to wares or whether this simply occurred by default through the continued use of the same range of wares and forms.

Notes

- 1 Locality 243 is treated as a Bashendi A site; Locs 200, 259, 401, 407, 422 and 423 are treated as Bashendi B sites; and Locs 028, 131, 218, 224, 405, 409, 420, FS4, FS5, FS8 and FS9 are treated as Late Sheikh Muftah sites. Localities 005, 012, 076 and FS1 have been excluded from the final analysis.
- 2 The Early and Late Sheikh Muftah phases were combined in this case because the length of each phase remains unknown in absolute terms.
- 3 In establishing this pattern, it is important to consider that the Bashendi pottery was subject to more protracted processes of post-depositional transformation, and this could affect the original numbers more than it does for the Sheikh Muftah. But it is unlikely that this involves a significant quantity of pottery. Although much of the Bashendi pottery is poorly preserved, many sherds are still quite robust and far from being completely eroded.
- 4 This pattern exists even when factoring in the compacted-and-coated, compacted-and-textured and compacted-and-decorated treatments that form a very small percentage of the overall collection.

PART II

Chapter 6

Provenance

Building on the characterisation of the Dakhleh pottery collection, this chapter seeks to distinguish imported examples from the locally made examples. As a study in provenance, it has the dual purpose of refining our understanding of the oasis pottery traditions belonging to the Bashendi and Sheikh Muftah, while highlighting degrees to which these cultural units engaged in cross-cultural relations and exchange, as demonstrated through the presence of imported pottery in the oasis. It is also intended to provide further explanation for why some pottery examples were treated as imports in the quantitative analysis.

Identification of provenance is based primarily on macroscopic examination of fabric type in combination with thin-section analysis. Supporting evidence for the identification of provenance, such as decoration, is used wherever possible. Thin-section analysis was conducted by Dr Mark Eccleston on 52 samples from the Dakhleh collection. This includes the analysis of 12 samples already published (Eccleston 2002), along with 40 additional samples examined in 2004 and presented in section 6.2 of the current study.¹

Ten petrographic groups were determined among the samples from Dakhleh submitted to thin-section analysis in 2004, which are matched in Table 10 against fabric types identified in Chapter 3. Thin-section analysis indicated that Groups I–VIII have petrographic profiles compatible with locally made pottery manufactured during historic times, while Groups IX and X are most likely imports. This is discussed further below in reference to individual fabric types. The thin-section analysis also indicated a pattern in the data not previously observed. There appear to be two main fabric clusters among the locally made pottery produced during the mid-Holocene. One of these, not surprisingly, includes the sand-and-shale (1A–C) and shale-rich fabrics (2B–C), represented in Groups I and IV–VII, which appear to be closely related in their make-up. The second cluster is represented in the Fine Ferruginous Groups II, III and VIII and includes

Fabrics 3A–B, 4A–C, 5A–B and 7A–C. These too appear to be closely related and are differentiated largely by the presence/absence of organic inclusions. These fabrics have been largely overlooked in the current study, mainly because they appear in fewer frequencies than the more common material. Suffice it to say, more attention will be paid to these fabrics in future studies investigating temporal and/or spatial distributions.

In the process of identifying imports an attempt has been made to determine a point of origin based on comparative examples in the literature. This could not always be achieved with precision. Problems in establishing an exact provenance for the local material also exist. While it may be assumed that locally made pottery was produced within the ancient oasis borders, wherever these lie exactly, firsthand examination of ceramic material from Kharga Oasis (Warfe unpublished report a; unpublished report b), El Kharafish and Abu Gerara (pers. observ., December 2004) reveals close similarities to the Dakhleh material, to the degree that some examples are indistinguishable. With this in mind, the pottery identified as ‘local’ was likely produced in Dakhleh or within the immediate vicinity, whereas those identified as ‘imports’ were produced beyond the central Western Desert in areas of the southern Western Desert or in the Nile Valley – Fig. 33 identifies locations mentioned throughout this chapter.

6.1 Distinguishing locally made and imported pottery

More than half the fabrics identified in the collection are thought to be local. This includes all five varieties from Fabric Family 1. The ubiquity of sand-and-shale fabrics on prehistoric sites, and the continued manufacture of similar fabrics into historic times (Eccleston 2002, 67; section 6.2), supports this identification. Examples of the fine sand-and-shale fabrics have been produced experimentally from local clays (Warfe and Jamieson 2006; Warfe forthcoming a), and thin-section analysis

Table 10. Comparative thin-section and macroscopic fabric groups

	Thin-section	Chapter 3
I.	Coarse Ferruginous	1A; 1A; 1A; 1A; 1A; 1A; 1B; 1B; 1B; 1B
II.	Fine Ferruginous	3A; 3A; 3B; 5A; 5B; 5B; 7A; 7B; 7C; 7C; 7C
III.	Vegetal Tempered Fine Ferruginous	4A; 4A; 4A; 4C; 7B
IV.	Coarse Shale	2B; 2B; 2C; 2C
V.	Coarse Shale and Quartz	1C; 2C
VI.	Coarse Shale, Quartz and Limestone	1C
VII.	Medium Shale	1A; 1A; 1C
VIII.	Organic	4B
IX.	Nile Silt	6B
X.	Microfossil	6A; 6A

confirms that these fabrics fit the petrographic profile of the oasis (section 6.2 fabric Groups I, VI–VII; Eccleston 2002, 66–7). While these comments relate specifically to Fabrics 1A–C, they can be extended to Fabrics 1D–E as these differ insubstantially from the more common examples. The fact that Fabrics 1A and 1C appear together in Eccleston's Medium Shale Group VII (Table 10) must be acknowledged and alerts the analyst to the different visual properties of the fabric generated under magnification using a polarising microscope.

All fabrics from the shale-rich family (2A–D) are also thought to be manufactured locally. Although the precise source of the clays and inclusions are yet to be located, they are clearly related to the oasis petrology, which is confirmed through thin-section analyses on samples of Fabrics 2B–C (section 6.2 fabric Groups IV and V; also Eccleston 2002, 68). This identification can be extended to Fabric 2A and Fabric 2D as these too differ insubstantially from the more common types.

The shale-tempered pottery is often treated as a hallmark of manufacture in the central Western Desert. Alongside its ubiquity in Dakhleh Oasis, shale-tempered fabrics are common to the mid-Holocene collections from the Midauwara region in Kharga Oasis (McDonald *et al.* 2004, 7; McDonald *et al.* 2005, 6; Warfe unpublished report a; unpublished report b) and the Abu Tartur plateau, where fine shale-tempered pottery and variants of coarse shale-tempered pottery (Fabrics 2 and 4A–C) have been identified by the ACACIA team (Riemer and Schönfeld 2006, 339). Extending northwards along the Abu Muhariq plateau, shale-tempered fabrics are recorded at Abu Gerara and the Farafra Sand Sea and include the fine and very coarse variants (ACACIA Fabrics 2 and 4A) (Riemer and Schönfeld 2010, 727–8), and further east examples of fine and coarse shale-tempered pottery (ACACIA Fabrics EK 3B and EK 6A/C) have been recorded at Kharafish sites: the descriptions and images (Riemer 2011, 41, 50, Fig. 14.8, 10–11, 16–18) are reminiscent of the Dakhleh 1A–C and 2B–C fabrics, respectively.

Gatto's (2012) much welcomed survey of shale-tempered fabrics across northeast Africa demonstrates that this fabric type appears on a wider scale than originally thought, and is not confined to the central Western Desert.

Examples are cited for the Nabta-Kiseiba region, Kurkur Oasis and the Rayayna Desert, and various points in southern Upper Egypt (Gatto 2012, *passim*) – to this list could also be added Eastpans (Gehlen *et al.* 2002, 96–7) and the Abu Ballas Trail (Hendrickx *et al.* 2013, 341–2). Notably, shale-tempered pottery is not common to the Farafra collection, which may suggest containment to the latitude of the southern oases and further south (Muntoni and Gatto 2014, 457).

From Fabric Family 3, the first two examples (3A–B) are almost certainly local, identified as belonging to the Fine Ferruginous fabrics with a petrographic fingerprint matching the oasis. While this identification relies on thin-section analysis, at $\times 40$ magnification the 3A–B fabrics are not entirely different to examples from Fabric Family 1, with the exception that shale is not visibly present. Otherwise, the groundmass and distribution of sand is compatible with Fabrics 1A and 1B, and all other features of the examples (surface treatment and shape) are consistent with locally made pottery. These fabrics may simply represent local manufacture using clay sources that do not contain obvious shale particles, wherever these are to be located. As the Fabric 3C is comparable in basically all respects with Fabrics 3A–B, this too is probably best considered the product of local manufacture.

Fabrics 3D and 3E stand out in this respect and are most likely imports. Doubts over the local provenance of the Fabric 3E examples from Masara A Loc. 076 have already been raised in this study (section 4.3) and elsewhere (Hope 2002, 40; Warfe 2006). Describing this fabric as 'Coarse Grit Fabric II', Eccleston (2002, 63) drew attention to the possible igneous particles as an indicator of non-local manufacture: there is no evidence to suggest that the local geology formed through volcanic activity (Kleindienst *et al.* 1999). Despite its identification as an import in several publications (Eccleston 2002; Hope 2002; Warfe 2006), a point of origin has not been offered for this fabric. If this pottery was introduced during the Masara period the most likely source would be from the south of the Western Desert, possibly the Nabta-Kiseiba area. Here a type of coarse fabric pottery was manufactured during the El Adam and El Ghorab (*c.* 8500–7200 cal. BC) occupations, and petrographic analyses on several samples indicate

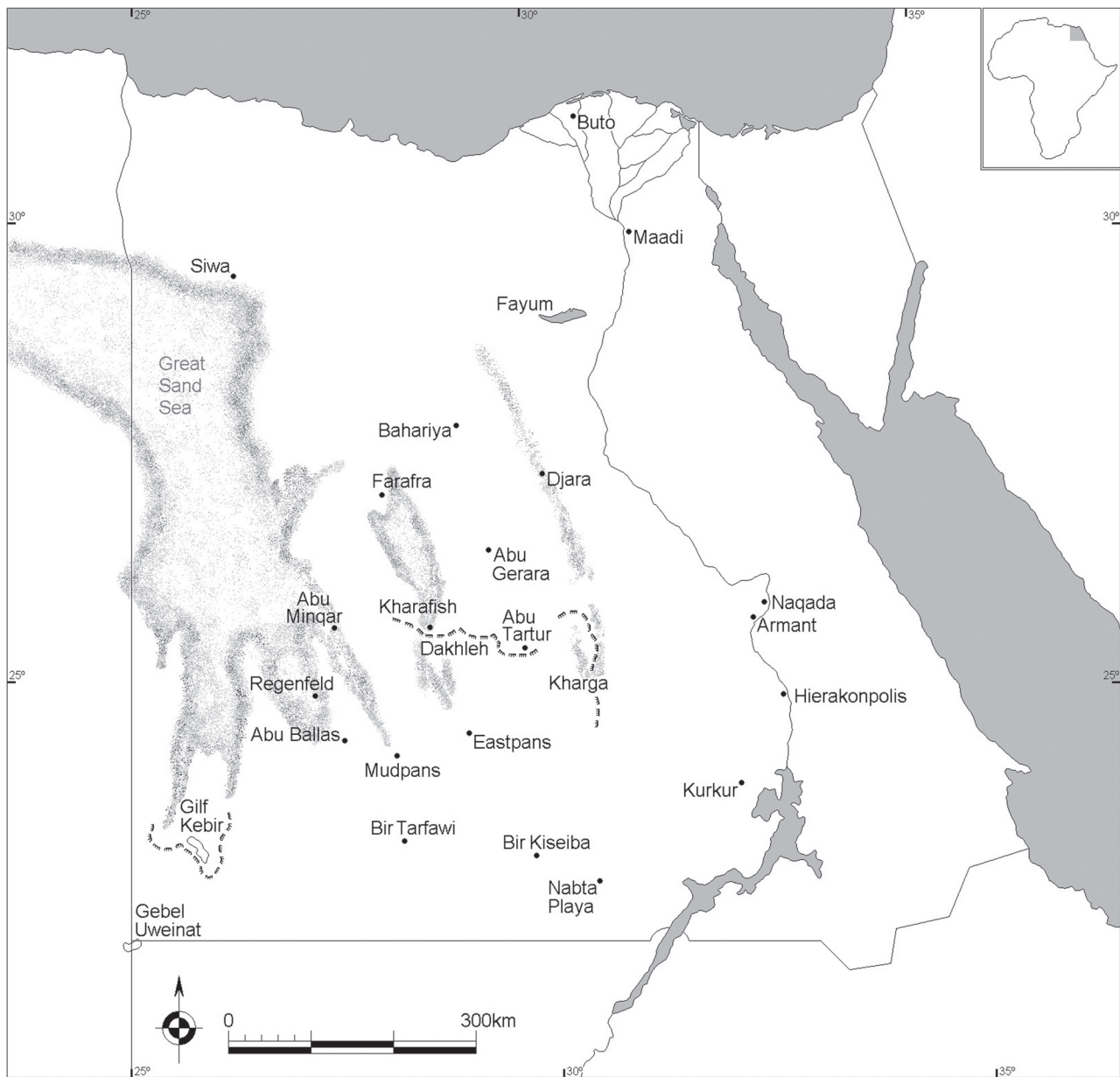


Figure 33. Map of Egypt identifying areas of occupation mentioned in text.

they derive from igneous parent materials (Zedeño 2002, 53–4). It is important to add that El Adam/El Ghorab pottery is extensively decorated with impressions and incisions (Wendorf and Schild 2001, 654; Nelson 2002b, 10–11, Fig. 2.1), whereas the surfaces of the Fabric 3E finds bear no such marks. Still, the examples were heavily worn to the point that any impressions/incisions may have eroded from the surface.

The Fabric 3D examples are also likely to have come from a southerly or perhaps south-westerly direction. Eccleston (2002, 63–4) has previously described this fabric as ‘Coarse Quartz’ suggesting a non-local origin based on the distribution of sand particles and presence of mica-like inclusions, neither of which have been reported for Dakhleh fabrics from any other period. A similar

description referring to ‘small rock temper’ is reported for the Early Neolithic Al Jerar pottery from Nabta-Kiseiba (Nelson 2002c, 6), and pottery with ‘... a dense texture of angular or gently rounded quartz temper’ (Gehlen *et al.* 2002, 96) is reported in the Eastpans and Mudpans regions, in contexts dated *c.* 6700–6300 cal. BC.

While these comparisons are not overly strong, a far more compelling case can be made on account of the surface treatment. Both examples of the 3D fabric from Dakhleh bear impressed decoration on the exterior surface (Pl. 2f) that compares with the ‘rocker-stamp/zig-zag’ technique/motif identified by the Combined Prehistoric Expedition (CPE) and ACACIA teams for decorated pottery in the southern Western Desert (Gatto 2002a, 68, Fig. 5.3; Riemer and Jesse 2006, 64, Fig. 3). The examples

from Dakhleh come from Bashendi A Locs 275 and 307, both of which yield radiocarbon dates within the second half of the seventh millennium cal. BC (McDonald 2001, Table 3.1; 2008, Table 2), and undoubtedly bear witness to the northward spread of the 'Khartoum-related' tradition around this time (Kuper 1995, 129; Riemer and Jesse 2006).

Fabric 3F is more difficult to provenance and it has already been implied that it was locally made (subsection 4.4.1). This identification was based on the excavated sample from Loc. 270, which matches other Bashendi A pottery in terms of its fineness, absence of decoration and wall thickness. Still, this is not an overly compelling argument and is weakened considerably by the other 3F find which appears in the Late Sheikh Muftah collection. Without thin-section analysis, the provenance of Fabric 3F cannot be securely determined.

Fabrics 4A–C have been identified through thin-section analysis as locally made products. Fabrics 4A and 4C belong to the Vegetal Tempered Fine Ferruginous Group III and share the same petrographic profile as Fabric 3A–B samples, with the main point of difference being the presence/absence of organic inclusions. Fabric 4B is more distantly related, belonging to Eccleston's Organic Group VIII (section 6.2). A problem in the identification and grouping of Fabric 4A samples must be acknowledged here. A total of nine samples were identified in this study. Three of these were identified as locally made through thin-section analysis, whereas a fourth was identified as an 'Ash-tempered Silt' possibly from the Nile Valley (Eccleston 2002, 66, 69) and another was identified as a 'Nile B1 Silt' (Eccleston 2002, 64–5). That this distinction was overlooked highlights once again that identification through standard binocular microscope even at $\times 40$ magnification may not be sensitive enough to pick up discrete variations. Although misidentifications of this type are less likely to occur with the more distinct fabrics in the collection, this serves as a cautionary note and suggests that further refinements may occur through future thin-section analyses.

The example identified as an Ash-tempered Silt, which comes from the Upper Pleistocene Loc. 005, also bears unusual decoration in the form of fingernail incisions (Pl. 9f). Hope (2002, 51) compared this piece to various elements of A-Group pottery including the Fabric IIA, and H3 Ware Group (Nordström 1972, 51, 62–3), and with a number of sherds from (A-Group) site 430 in terms of decoration (Nordström 1972, Pl. 137.1–3 and 7). Another example of the Fabric 4A also stands out for its decoration. This comes from Findspot 1 and has finely spaced square impressions on the exterior surface (Pl. 2e). There is no way of dating Findspot 1, except to say that it sits in a basin a few hundred metres east of the Late Sheikh Muftah Locality 136 (Fig. 18). The decoration is essentially identical to the 'impressed with dot patterns' ware reported for the 'Saharan Culture' of the Armant region in Upper Egypt (Mond and Myers 1937, 267). The

scant description of this pottery – notwithstanding the comments on highly technical features – makes it difficult to compare beyond decoration.² But the decoration alone is sufficient to consider this particular example of the Fabric 4A an import.

The fact that organic tempered fabrics are imported and produced locally does not help to narrow down the provenance of Fabrics 4D–G. Two examples of the Fabric 4D come from the Bashendi B Locality 304 and the Early Sheikh Muftah Locality 139. The Bashendi example is worn and surface treatment could not be determined. The Sheikh Muftah example displays a lustre on the exterior surface resulting from a high compaction. This type of surface treatment is not found on any of the locally made organic fabrics which could suggest that this example, and perhaps the find from Loc. 304, are imports. Hope (2002, 51) identified the example from Loc. 139 as a Nile silt. Although the 4D fabric compares with the Nile C in description (Nordström and Bourriau 1993, 173–4), the connection is not as obvious in section photographs (compare Pl. 6d with Nordström and Bourriau 1993, Pl. IIe–i).

One of the Fabric 4E examples has already been identified as an import (Hope 2002, 51). The shape is unusual to the Dakhleh collection and Hope (2002, 51) suggested a parallel with the type 5a jar in the Maadi collection from the Nile Valley (Rizkana and Seeher 1987, Pls 34–5). While some of these also bear single rows of fingernail impressions on the upper body similar to the example from Dakhleh (see Hope 2002, Fig. 7c), the fabric (Ware II) typically has minimal amounts of organic temper (Rizkana and Seeher 1987, 28–9). Citing the work of Köhler (1998, 10–11) and von der Way (1997, 99–100, 189–91, Pls 41–2), Hope (2002, 51) also draws on connections with the Buto corpus from the Nile Delta on account of similarities in decoration found on a 'fibre ware' from Schicht I, on larger vessels from Schicht II, and with Petrie's (1921) P76 series (compare Hope 2002, Fig. 7c with Petrie 1921, Pl. XIII.76). Another association might be drawn with the P40 example (Petrie 1921, Pl. XI.40f).

These associations should probably not be extended to the remaining Fabric 4E examples. The 4E fabric is fairly non-specific in description in that it fires different colours, has varying levels of sand and organic inclusions and has come to serve as a default category for the more generic organic-tempered finds. This is demonstrated by the spread of Fabric 4E examples on Bashendi A and B sites and Late Sheikh Muftah sites. The generalities in description hamper attempts to assign the remaining Fabric 4E examples a provenance, especially as none bear decoration. If they are imports, determining a point of origin is complicated by the widespread production of organic-tempered fabrics throughout the desert region and Nile Valley, including the Fayum (Nordström 1972, 41–2, 51, 80; Banks 1980, 302; Klees 1989, 229; Kozłowski and Ginter 1989, 166; Nordström and Bourriau 1993, 163, 171–4; Friedman 1994, 142–51; Gehlen *et al.*

2002, 96–7, 105; Nelson 2002c, 6–7; Riemer 2003, 84–6; 2011, 39, 51; 2012, 336–41; Riemer and Schönfeld 2010, 727–9; Muntoni and Gatto 2014, 450–7; Warfe unpublished report a; unpublished report b; see also the NEAPPO fabric list http://www.uni-koeln.de/sfb389/a/a1/a1_informations_neappo_fabric.htm). As the 4F fabric is basically a coarser version of the 4E fabric, it is uncertain whether to treat this as an import or a variant of the more common local organic fabrics.

Fabric 4G, by contrast, can be more confidently identified as an import. One of the examples is textured and appears in the form of a truncated cone. While the organic inclusions are somewhat finer, the structure of the groundmass and the inclusions indicates a commonality with the other two Fabric 4G examples, both of which bear impressed decoration on the exterior surface (see for instance Pl. 2d). One of these examples, from Loc. 135, has been compared with pottery of the Tenerian culture of Niger by Hope (2002, 48). An extremely similar find has also been reported much closer to home, from Abu Tartur (Riemer and Schönfeld 2006, Fig. 6). Charcoal found on the sherds has been radiocarbon dated to 640 ± 50 BP (KN-3725) (Riemer and Schönfeld 2006, 352), which is clearly at odds with a mid-Holocene date. While we cannot dismiss the possibility of industrious re-use of artefacts by later (Islamic) desert travellers, it is important to consider that the example from Loc. 135 may have been deposited at a much later date than other pottery from this site.³ A more detailed study of this vessel and the truncated cone recorded as a 4G fabric has been earmarked for future studies.

The third example of the 4G fabric, from Loc. 212, has generated considerable discussion. Initially identified as basketry impression (Tangri 1991b), and then re-identified as ‘imitation-basketry’ impression (Hope 2002, 45), this design has drawn several comparisons from wide-ranging contexts (Tangri 1991b, 141; Hope 2002, 45), some of which are difficult to reconcile with the Bashendi B in spatial/temporal terms. Basketry designs have been recorded among pottery collections from the Sudanese Nile Valley including the Khartoum Variant (Shiner 1968, 783) and Khartoum Mesolithic (Arnell 1949, 83, 86–8). Banks’ (1980, 304) ‘woven mat’, which is said to resemble basket weave, has been recorded in the Gebel Uweinat and Wadi Bakht (Gilf Kebir) collections (Banks 1980, 311; 1984, 159), and a comparable design is found in the Bir Tarfawi collection (Banks 1980, 313–14). It also appears in the Nabta Playa collection (Banks 1980, 304), where it is now identified with the ‘simple rocker-stamp’ and ‘Halina’ types (Gatto 2002a, Fig. 5.2). In particular, the example from Loc. 212 is considered reminiscent of the double-pronged alternately-pivoting stamp return technique (M. Gatto pers. comm., December 2004; see also Caneva 1987, 242–4) that can be found in the Nabta-Kiseiba collection where it is identified with the former ‘Wolfteeth’ design (Banks 1980, 305; Gatto 2002a, Fig. 5.2).

Fabrics 5A and 5B differ little from each other and thin-section analysis indicates both were locally made. Fabric 5B, in particular, is interesting for the presence of rounded vegetal inclusions. It is possible that these are seeds added to the paste, which builds associations with ‘seed-tempered’ fabrics identified at Farafra (Muntoni and Gatto 2014, 450–1), Eastpans (Gehlen *et al.* 2002, 97), Djara and Abu Gerara (Riemer and Schönfeld 2010, 727; Pl. 1.2–5) and Nabta Playa (Magid 2001). A seed-tempered fabric is also identified from Abu Tartur (Riemer and Schönfeld 2006, 339; visual comparisons may be drawn with sample AT0026_13 on the NEAPPO website (http://www.uni-koeln.de/sfb389/a/a1/a1_informations_neappo_areas.htm)).

Fabrics 6A–B were found to be imports. Although the petrographic examination of Fabric 6A was not completed (see above), it was distinguished by Eccleston for its microfossil content (Group X) and very tentatively ascribed a provenance along the Mediterranean coastline, despite the local presence of microfossils. Fabric 6B is more compellingly ascribed a Nile Valley provenance. Eccleston (2002, 65) has previously drawn comparisons with Petrie’s (1901, 16) Rough ware (R class), and also with the Hierakonpolis Fabric/temper class I: Straw tempered Nile silt (Friedman 1994, 142–6), Naqada Fabric/temper class I: Straw tempered Nile silt (Friedman 1994, 506), and Hierakonpolis Fabric/temper class 4: Straw and Stone tempered Nile silt (Friedman 1994, 147–8). In reviewing these comparisons, the most compelling is the Hierakonpolis Fabric/temper class I: Straw tempered Nile silt, on account of the ‘Minor inclusions of limestone, carbonates, opaque white or grey angular grits (calcite? anhydrite?) ...’ (Friedman 1994, 143). This description also vaguely fits the Fabric 6A profile, which appears as a finer version of the 6B fabric. An examination of other classifications for the Nile Valley has failed to reveal similar fabrics, though examples have been recorded from prehistoric sites in Kharga Oasis (Warfe unpublished report a; unpublished report b).

Petrographic analysis indicated that Fabrics 7A–C were locally made (Group II), which is not surprising as these are produced from medium-bodied ferruginous clays. The 7C fabric, in particular, contains the same range of inclusions as the sand-and-shale fabrics. The defining feature of these fabrics are the clay aggregates. While it was suggested that the aggregates are possibly the result of mixing clays (subsection 2.2.2), the 7A–C fabrics are very similar in appearance to the ‘grog-tempered’ EK 5B fabric recorded in the ACACIA collection from sites at Kharafish, Meri and within the vicinity of Dakhleh (Riemer 2011, 50–1, see in particular Fig. 14.14 and 14.23–5) deemed contemporary with the Sheikh Muftah. Grog is also recorded as a temper with the ACACIA Fabric 6 at Abu Gerara (Riemer 2011, Table 4) and as the key tempering agent at Hierakonpolis in relation to Fabric/temper class 7: Grog and organic tempered Nile silt, and

Fabric/temper class 27: Grog and organic tempered Nile silt (Friedman 1994, 152–3).

Whether the 7A–C fabrics are, in fact, grog-tempered and somehow related to this broader trend needs to be ascertained by way of a more focussed study. For now, it is important to note that a field experiment conducted several years ago attempted to reproduce grog-tempered pottery as part of a broader aim to identify ancient production techniques using local materials (Warfe and Jamieson 2006). As the replicate fabric looked nothing like the 7A–C originals, it was determined that grog was not used in the local pottery production (Warfe forthcoming a), a conclusion that needs to be reassessed now in light of the more recent identification of the EK5B fabric.

The 8A fabric is identifiable as a Nile Valley import. Eccleston (2002, 66) has compared samples with the Marl A1 fabric in the Vienna System (Nordström and Bourriau 1993, 176, Pl. IVc), and this association still holds in the current study. Hope (2002, 51) suggested that samples from Locs 059 and 069 are from Early Dynastic storage jars. This identification could apply to the remaining examples of Fabric 8A, which differ insubstantially in appearance and are all from Late Sheikh Muftah sites.

Fabrics 9A and 9C have not been examined in thin-section. The dense appearance, fine vegetal inclusions and glinting particles suggest a Nile Valley origin, though comparisons are not immediately obvious with the Vienna System silts (Nordström and Bourriau 1993, 169–75, Pls I–III). Possibly, the examples from Dakhleh belong to the category of mixed clays observed in the Nile Valley (Nordström and Bourriau 1993, 166–7), descriptions for which are appearing more prominently in publications (Bourriau *et al.* 2000, 19–25; Rzeuska and Ownby 2009, 141–5; Ownby 2016, 466–7). The 9B fabric was examined in thin-section and defined as a ‘Limestone-Tempered Fabric’ (Eccleston 2002, 65). Eccleston (2002, 65) reports that the clay could be local but the reduced firing conditions and decoration suggest a non-local origin: the decoration is another example of the basket-like motif and, as Hope (2002, 51) points out, the wide distribution of this motif complicates attempts to ascertain a provenance.

6.2 Thin-section analysis (by Mark Eccleston)

The format of the petrographic descriptions is a slight modification of the system proposed by Whitbread (1995). The grain sizes were estimated using the graticule in the eyepiece of the microscope and the frequencies were estimated using the visual comparator charts in Matthew *et al.* (1991). The frequency labels used are semi-quantitative and are as follows:

Predominant: >70%; Dominant: 50–70%; Frequent: 30–50%; Common: 15–30%; Few: 5–15%; Very few: 2–5%; Rare: 0.5–2%; Very rare: <0.5%.

The following petrographic descriptions were made in 2004 in order to describe the characteristics of early and mid-Holocene ceramics from Dakhleh and Kharga Oases, to compare these to other ceramics analysed by similar methods and to provide the possible provenance of the samples.

Some of the fabrics are petrographically similar or identical to fabrics that are known from later periods in Dakhleh that have been described elsewhere (Eccleston 1997; 2002; 2006). There are others that are geologically compatible with Dakhleh or Kharga origin, but which are different to fabrics that have been examined previously. Where possible, a provenance for the imports has been suggested, however, due to a lack of published comparative material from the early and mid-Holocene, a precise provenance for some samples cannot be offered.

I. COARSE FERRUGINOUS (Fig. 34a–e)

Samples

Standard: 3, 4, 11, 23, 26, 27, 29, 35

Limestone or dolomite rich: 12, 33, 43

Microfossil rich: 45

Microstructure

This fabric generally has few voids overall. It includes rare micro to macro vesicles, rare meso to macro vughs and very rare to absent meso planar voids. Overall the voids are generally *c.* 0.2–0.3 mm with a maximum size of *c.* 4.0 mm. The voids do not appear to have any preferred orientation.

Groundmass

The groundmass appears to be homogeneous. The colour of the groundmass is orange/brown to grey/brown (PPL $\times 40$) and red/orange to grey/brown (XP $\times 40$). The groundmass is optically inactive.

Inclusions

c:f:v 10 μ m 15:80:5 to 25:70:5. Overall the inclusions seem to be moderately sorted with a modal size of *c.* 0.2 mm and a maximum size of *c.* 1.5 mm, and are rounded to very angular in shape.

Coarse Fraction, ≥ 0.1 mm

Dominant to frequent: ferruginous features, elongated ovoid, generally *c.* 0.3–0.4 mm in length, max. *c.* 0.65 mm; monocrystalline quartz, rounded to angular, generally *c.* 0.15–0.25 mm, max. *c.* 1.0 mm.

Common to absent: limestone (micrite) or altered limestone/dolomite, rounded to angular, generally *c.* 0.2–0.3 mm, max. *c.* 1.5 mm.

Few to absent: limestone (micrite), rounded to very angular, generally *c.* 0.2–0.3 mm, max. *c.* 1.5 mm.

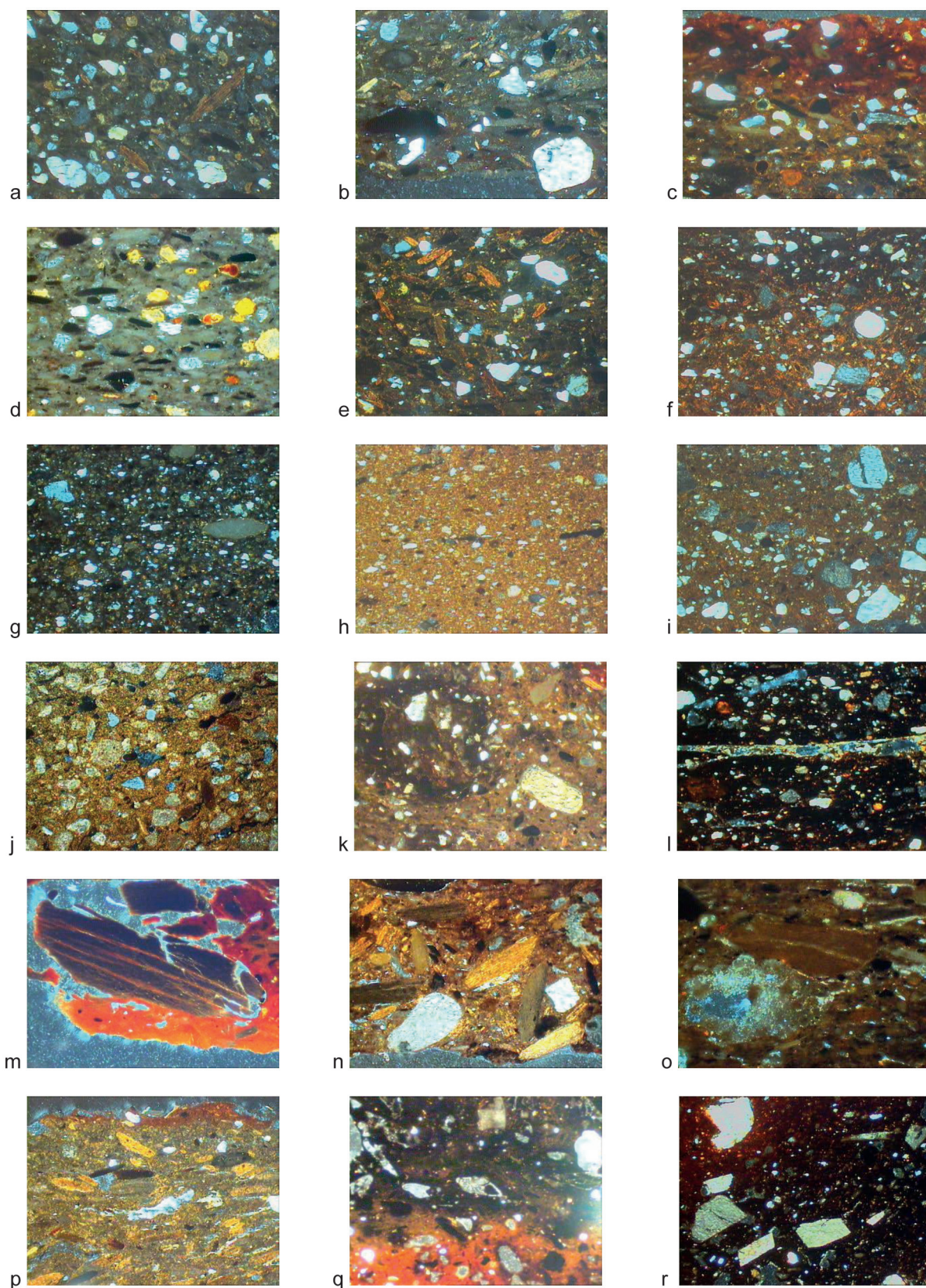


Figure 34. Thin-section photographs: a–e) Group I (Samples 23, 26, 27, 33 and 35); f–k) Group II (Samples 17, 30, 34, 38, 39 and 40); l) Group III (Sample 13); m) Group IV (Sample 20); n) Group V (Sample 24); o) Group VI (Sample 21); p) Group VII (Sample 5); q) Group VIII (Sample 31); r) Group IX (Sample 19).

<i>Very few:</i>	clay pellets, silty clay pellets, rounded to angular, generally <i>c.</i> 0.1–0.15 mm, max. <i>c.</i> 1.5 mm.
<i>Very few to absent:</i>	chert, sub-rounded to angular, generally <i>c.</i> 0.1–0.15 mm, max. <i>c.</i> 0.7 mm.
<i>Rare to very rare:</i>	polycrystalline quartz, sub-rounded to angular, generally <i>c.</i> 0.15–0.2 mm, max. 0.6 mm; opaques (iron oxide), rounded to sub-rounded, generally <i>c.</i> 0.1–0.15 mm, max. <i>c.</i> 0.2 mm.
<i>Rare to absent:</i>	microfossils, generally poorly preserved remains of planktonic and benthic foraminifera (most noticeable in Sample 45).
<i>Very rare to absent:</i>	sandstone, angular, <i>c.</i> 0.5 mm; dolomite, sub-rounded, <i>c.</i> 1.25 mm; plagioclase feldspar, tabular, generally <i>c.</i> 0.1 mm, max. <i>c.</i> 0.2 mm; alkali feldspar, sub-angular, <i>c.</i> 0.2 mm; microcline, sub-rounded, 0.2 mm; amphibole, sub-rounded, <i>c.</i> 0.12 mm; biotite mica, laths, <i>c.</i> 0.1 mm; clinopyroxene, sub-rounded, <i>c.</i> 0.1 mm.
<i>Fine Fraction, <0.1 mm</i>	
<i>Frequent:</i>	ferruginous features, elongated ovoid; monocrystalline quartz, rounded to angular.
<i>Common:</i>	clay pellets, rounded to sub-angular.
<i>Very few:</i>	opaques (iron oxide), rounded to sub-rounded.
<i>Very few to absent:</i>	polycrystalline quartz, sub-rounded to angular; chert, sub-rounded to angular.
<i>Rare to absent:</i>	limestone (micrite), sub-rounded to angular.
<i>Very rare to absent:</i>	amphibole, sub-rounded; biotite mica, laths; clinopyroxene, sub-rounded; epidote, sub-rounded; microfossils; plagioclase feldspar, tabular.

Comments

This fabric is characterised by the elongated, ovoid ferruginous features throughout the groundmass. The group is very mineralogically varied, but contains monocrystalline quartz, clay pellets and opaques throughout. There are also indications of chert, polycrystalline quartz and limestone in some sections. As with the examples of this fabric from later periods (Eccleston 1998; 2006), some samples contain microfossils and foraminifera consistent with the sedimentary deposits found across Dakhleh and Kharga.

Overall, this fabric is the most common and predominant of all periods at Dakhleh. It is consistent

with the A1, A2, A5, A14, A28 and A29 fabrics (Eccleston 2006) and also with previously published descriptions of Fine Quartz and Shale ceramics of the Bashendi and Sheikh Muftah periods (Eccleston 2002). The clay used to make these fabrics is present across the entire oasis and its use for ceramic production in all periods is to be expected.

II. FINE FERRUGINOUS (Fig. 34f–k)

Samples

Standard: 1, 6, 17, 25, 38, 40

Limestone: 18, 30, 32, 34, 39

Kharga: 44

Microstructure

The voids in this fabric comprise rare meso to macro channels, rare micro to macro vesicles and rare meso to mega vughs. Overall the voids are generally *c.* 0.25–0.5 mm with a maximum size of *c.* 1.5 mm. The voids do not appear to have any preferred orientation.

Groundmass

The groundmass appears to be homogeneous. The colour of the groundmass is orange/red to orange to brown/grey (XP $\times 40$) and orange/brown to grey/brown (PPL $\times 40$). The groundmass is optically inactive.

Inclusions

c:f:v 10 μ m *c.* 15:80:5 to 10:88:2. Overall the inclusions are moderately well sorted with a modal size of *c.* 0.15 mm and a maximum size of *c.* 1.5 mm, and are well rounded to very angular in shape.

Coarse Fraction, ≥ 0.1 mm

Dominant: monocrystalline quartz, rounded to angular, generally *c.* 0.1–0.15 mm, max. *c.* 0.75 mm.

Common to few: clay pellets and silty clay pellets, rounded to sub-angular and laths, generally *c.* 0.1–0.15 mm, max. *c.* 2.5 mm.

Very few: polycrystalline quartz, rounded to sub-angular, generally *c.* 0.2–0.3 mm, max. *c.* 0.7 mm; limestone (micrite), rounded to very angular, generally *c.* 0.1–0.25 mm, max. 0.4 mm (dominant to frequent in 18, 30, 32, 34, 39).

Fine Fraction, <0.1 mm

Frequent: monocrystalline quartz, rounded to angular; clay pellets, rounded to angular.

Very few: limestone, rounded to angular (dominant to frequent in 18, 30,

	32, 34, 39); opaques (iron oxide), rounded to sub-rounded.
<i>Rare to absent:</i>	polycrystalline quartz, sub-rounded to angular; microfossils.
<i>Very rare to absent:</i>	chert, sub-rounded; plagioclase feldspar, rounded; epidote, rounded to sub-rounded; biotite mica (some oxidised), laths.

Comments

The Fine Ferruginous fabric is characterised by an orange groundmass which is dominated by monocrystalline quartz and common clay pellets. It is distinguished from the Coarse Ferruginous fabric by the lack of ferruginous features in the groundmass. There still exist, however, the distinctive clay pellets and laths common to other local fabrics (Eccleston 2006). The mineralogy of this fabric is wholly consistent with an origin in Dakhleh Oasis. The fact that it corresponds well petrographically to the historic fabrics of A6, A11, B3b and B4 supports the identification of a Dakhleh origin.

The limestone variants show some variability in quantity of limestone and relative sorting and morphology of the fragments. Sample 39 is of particular interest as it has by far the best sorted (consistent particle size) limestone fraction, with all being well rounded to rounded. This is likely to indicate that the limestone was not added as a temper, but naturally occurring in the clay deposit. If crushed limestone was added to the paste, one would expect it to be more variable in size and more irregular in shape, with a higher proportion of angular fragments due to the way that limestone fractures when smashed by hand. This may indicate that the raw clay came from a particularly limestone-rich source. Further sampling of clay beds in Dakhleh and Kharga would be required in order to suggest a possible source location.

Sample 44 is from a site in the Kharga Oasis, and although it fits within the same petrographic grouping as the Dakhleh samples, it is quite distinctive texturally. This is mainly reflected in the texture of the groundmass. Differentiating sub-groups or different groups texturally may be worth pursuing as a means of differentiating fabrics made in the oases. This difference could represent slight geological differences in similar clay deposits and/or different paste recipes, firing, etc.

III. VEGETAL TEMPERED FINE FERRUGINOUS (Fig. 34I)

Samples

Standard: 2, 10, 13, 16, 22

Microstructure

The voids in this fabric comprise few meso to mega planar voids, rare meso to mega channels, very rare micro to macro vesicles and rare meso to mega vughs.

Overall the voids are generally *c.* 0.5–1.0 mm with a maximum size of *c.* 5.0 mm. The voids in this fabric are visually dominated by narrow, elongated planar channels, probably produced by fine organic temper. These elongated voids generally have a preferred orientation parallel to the vessel walls.

Groundmass

The groundmass appears to be homogeneous. The colour of the groundmass is orange/brown to black (XP $\times 40$) and brown/orange to black (PPL $\times 40$). The groundmass is slightly optically active.

Inclusions

c:f:v 10 μm *c.* 20:70:10. Overall the inclusions are moderately sorted with a modal size of *c.* 0.2 mm and a maximum size of *c.* 3.0 mm, and are well rounded to very angular in shape.

Coarse Fraction, ≥ 0.1 mm

<i>Predominant:</i>	monocrystalline quartz, rounded to angular, generally <i>c.</i> 0.1–0.15 mm, max. <i>c.</i> 0.75 mm.
<i>Common to few:</i>	clay pellets, rounded to sub-angular and laths, generally <i>c.</i> 0.1–0.15 mm, max. <i>c.</i> 2.5 mm.
<i>Very few:</i>	polycrystalline quartz, rounded to sub-angular, generally <i>c.</i> 0.2–0.3 mm, max. <i>c.</i> 0.7 mm.
<i>Rare:</i>	limestone (micrite), rounded to very angular, generally <i>c.</i> 0.1–0.2 mm, max. 1.2 mm (Sample 16 only).
<i>Very rare:</i>	grog or quartz-rich clay pellets, generally 1.0–2.0 mm (Sample 16 only).

Fine Fraction, < 0.1 mm

<i>Frequent:</i>	monocrystalline quartz, rounded to angular; clay pellets, rounded to angular.
<i>Very Few to absent:</i>	limestone, rounded to angular; opaques (iron oxide), rounded to sub-rounded.
<i>Rare to absent:</i>	polycrystalline quartz, sub-rounded to angular.
<i>Very rare to absent:</i>	plagioclase feldspar, rounded; epidote, rounded to sub-rounded; biotite mica (some oxidised), laths.

Comments

This fabric is almost identical mineralogically to the vegetal-tempered fabric of the Ptolemaic and Roman periods (Eccleston 1997; 2006). The major difference between the Neolithic fabrics and those of the Ptolemaic and Roman periods is the number and types of voids present, which appear to come from the intentional addition of a fine organic temper to the paste. This organic

temper burning out during the firing process has produced the distinctive, elongated planar voids that are clearly visible in the groundmass, and have been observed in the macroscopic classification of the sherds (section 3.1.4). This fabric is consistent with having being produced in Dakhleh and is clearly indicative of a sub-group of the ferruginous fabrics based on the presence of organics, purposively added by the potter.

IV. COARSE SHALE (Fig. 34m)

Samples

Standard: 7, 8, 9, 20, 41

Microstructure

This fabric generally has few voids overall. It includes rare micro to macro vesicles, very few to few micro to mega vughs and very few meso to mega channels. Overall the voids are generally *c.* 0.3–0.6 mm with a maximum size of *c.* 4.0 mm. The voids do not seem to have any preferred orientation.

Groundmass

The groundmass appears to be homogeneous. The colour of the groundmass is orange to orange/red to brown to grey (PPL $\times 40$) and orange to orange/red to brown to grey (XP $\times 40$). The groundmass is slightly optically active in some samples and optically inactive in others.

Inclusions

c:f:v 10 μ m 60:35:5 to 20:70:10. Overall the inclusions seem to be poorly sorted with a modal size of *c.* 2.0 mm and a maximum size of *c.* 6.0 mm (or larger), and are rounded to very angular and lathlike in shape. It is notably difficult to quantify the difference between the coarse fraction of aplastic inclusions in this fabric and the fine fraction of clay groundmass that is less than the 10 μ m fraction.

Coarse Fraction, ≥ 0.1 mm

Predominant: mudstone, claystone, and/or 'shale' laths, generally 0.5–2.0 mm, max 6.0 mm (or larger).

Common: monocrystalline quartz, angular to rounded, generally 0.15–0.25 mm, max. *c.* 0.5 mm; clay pellets, sub-angular to well-rounded, generally *c.* 0.15–0.3 mm, max *c.* 2.0 mm.

Few: opaques (iron oxide), sub-rounded to well-rounded, generally *c.* 0.1–0.2 mm, max. *c.* 0.3 mm.

Fine Fraction, < 0.1 mm

Frequent: clay pellets, sub-rounded to well-rounded; monocrystalline quartz, angular to rounded; opaques (iron oxide), sub-rounded to well-rounded.

Comments

This fabric is the most macroscopically distinctive fabric produced in Dakhleh at any time. It is characterised by the very large fragments of mudstone, claystone and/or shale laths that are clearly visible with the naked eye. There are very few other aplastic inclusions and it appears from the thin sections that sand was not intentionally added to the paste as a filler. This fabric is extremely hard and may have been made for a specific purpose.

V. COARSE SHALE AND QUARTZ (Fig. 34n)

Samples

Standard: 24, 37

Microstructure

This fabric generally has few voids overall. It includes rare micro to macro vesicles, very few to few micro to mega vughs and very few meso to mega channels. The voids are generally *c.* 0.3–0.6 mm with a maximum size of *c.* 4.0 mm and do not seem to have any preferred orientation.

Groundmass

The groundmass appears to be homogeneous. The colour of the groundmass is orange to orange/red to brown to grey (PPL $\times 40$) and orange to orange/red to brown to grey (XP $\times 40$). The groundmass is slightly optically active in some samples and optically inactive in others.

Inclusions

c:f:v 10 μ m 50:45:5. Overall the inclusions seem to be poorly sorted with a modal size of *c.* 2.0 mm and a maximum size of *c.* 4.0 mm, and are rounded to angular in shape, with the predominant coarse fraction being lathlike.

Coarse Fraction, ≥ 0.1 mm

Dominant: mudstone and/or claystone laths, generally *c.* 0.5–1.0 mm in length, max. *c.* 4.0 mm.

Frequent: monocrystalline quartz, well rounded to sub rounded, generally *c.* 1.0–1.3 mm, max. *c.* 1.6 mm.

Few: clay pellets, subangular to well-rounded, generally *c.* 0.15–0.3 mm, max *c.* 2.0 mm; opaques (iron oxide), sub-rounded to well-rounded, generally *c.* 0.1–0.2 mm, max. *c.* 0.3 mm.

Fine Fraction, < 0.1 mm

Frequent: clay pellets, sub-rounded to well-rounded; monocrystalline quartz, angular to rounded; opaques (iron oxide), sub-rounded to well-rounded.

Comments

This fabric is similar to the Coarse Shale fabric, and seems to be made with a slight variant of the clay used

for the Coarse Shale fabric. While both samples fit within the same basic petrographic fabric group, Sample 37 is visually distinguishable from Sample 24 on the basis of its aplastic inclusions being larger/coarser. It is not possible to say with certainty whether the quartz was added as a filler to the clay paste, or if it is naturally occurring in the clay deposit.

VI. COARSE SHALE, QUARTZ AND LIMESTONE (Fig. 34o)

Samples

Standard: 21

Microstructure

This fabric generally has few voids overall. It includes rare micro to macro vesicles, rare meso to macro vughs and rare macro planar voids. Overall the voids are generally *c.* 0.25–0.5 mm with a maximum size of *c.* 1.5 mm. The voids do not seem to have any preferred orientation.

Groundmass

The groundmass appears to be homogeneous and is optically inactive. The colour of the groundmass is brown (PPL $\times 40$) and brown (XP $\times 40$).

Inclusions

c:f:v 10 μ m 20:75:5. Overall the inclusions seem to be poorly sorted with a modal size of *c.* 0.5 mm and a maximum size of *c.* 6.0 mm, and are rounded to very angular and lathlike in shape.

Coarse Fraction, ≥ 0.1 mm

Dominant: mudstone and/or claystone laths, generally *c.* 0.5–1.0 mm in length, max. *c.* 6.0 mm.

Frequent: monocrystalline quartz, well-rounded to sub-rounded, generally *c.* 1.0–1.3 mm, max. *c.* 1.6 mm.

Common: limestone (micrite), very angular to rounded, generally *c.* 0.2–0.3 mm, max. *c.* 2.4 mm.

Few: clay pellets, sub-angular to well-rounded, generally *c.* 0.15–0.3 mm, max *c.* 2.0 mm; opaques (iron oxide), sub-rounded to well-rounded, generally *c.* 0.1–0.2 mm, max. *c.* 2.0 mm.

Fine Fraction, < 0.1 mm

Frequent: clay pellets, sub-rounded to well-rounded; monocrystalline quartz, angular to rounded; opaques (iron oxide), sub-rounded to well-rounded.

Comments

This fabric is also comparable to the Coarse Shale fabric, however, it can be distinguished by the presence of quartz and limestone in the section. Like the Coarse Shale and

Quartz fabric, it is not possible to determine whether the limestone was added intentionally to the paste as a filler, or if it is naturally occurring in the clay deposit used to make the vessel.

VII. MEDIUM SHALE (Fig. 34p)

Samples

Standard: 5, 15, 28

Limestone-rich: 42, 47

Microstructure

The voids in this fabric comprise rare meso to macro channels, rare micro to macro vesicles and rare meso to mega vughs. Overall the voids are generally *c.* 0.2–0.4 mm with a maximum size of *c.* 1.2 mm. It is not possible to determine if the voids have any preferred orientation.

Groundmass

The groundmass appears to be homogeneous and is optically active. The colour of the groundmass is orange/brown to brown/grey (XP $\times 40$) and orange/brown to grey/brown (PPL $\times 40$).

Inclusions

c:f:v 10 μ m *c.* 15:80:5 to 10:88:2. Overall the inclusions are moderately well sorted with a modal size of *c.* 0.15 mm and a maximum size of *c.* 1.5 mm, and are well rounded to very angular and lathlike in shape.

Coarse Fraction, ≥ 0.1 mm

Predominant: mudstone, claystone laths, generally *c.* 0.2–1.2 mm in length, max. *c.* 1.5 mm.

Frequent: monocrystalline quartz, angular to rounded, generally *c.* 0.15–0.3 mm, max. *c.* 1.2 mm.

Frequent to rare: limestone (micrite), angular to well-rounded, generally *c.* 0.2–0.4 mm, max. *c.* 1.0 mm (frequent in Samples 42 and 47).

Few: clay pellets, subangular to well-rounded, generally *c.* 0.15–0.3 mm, max. *c.* 0.5 mm; opaques (iron oxide), subangular to well-rounded, generally *c.* 0.15 – 0.3 mm., max. *c.* 1.2 mm.

Very rare to absent: polycrystalline quartz, sub-rounded to rounded, generally 0.3–0.4 mm, max. *c.* 1.6 mm; microfossils (Sample 5 only).

Fine Fraction, < 0.1 mm

Frequent: monocrystalline quartz, rounded to angular; clay pellets, rounded to angular.

Very few: Limestone, rounded to angular; opaques (iron oxide), rounded to sub-rounded.

Very rare to absent: polycrystalline quartz, sub-rounded to angular.

Comments

This fabric is characterised by the presence of predominant mudstone, claystone and 'shale' laths in the section. The inclusions are a finer fraction than in the Coarse Shale Fabric and seem distinct from the similarly shaped inclusions in the Coarse Ferruginous fabric. The other inclusions and the general texture of the fabric indicates a provenance of Dakhleh and/or Kharga. There is a degree of variability in these samples, however, the broad similarities would indicate that they are better grouped together, as having being produced from the same type of raw materials, than attempting to differentiate them.

Sample 5 seems to be a coarser variant, with the quartz present being larger and more rounded than the other two standard samples. This might indicate a regional variation, however, a much larger sample set from several diverse locations would be required to demonstrate this conclusively.

Samples 42 and 47 have more limestone inclusions and may indicate a Kharga regional variation made with clay from a similar geological deposit, but containing more limestone. They have been grouped together here due to the broad similarity of the clay matrix.

VIII. ORGANIC TEMPERED (Fig. 34q)

Samples

Standard: 31

Microstructure

This fabric generally has few voids overall, which are visually dominated by very few macro planar voids and hemispherical voids that look like they were produced by the addition of organic temper (possibly seeds) to the clay paste. The other voids also include, rare micro to meso vesicles, very few micro to mega vughs (which includes the possible seed inclusions) and very few meso to mega planar voids. Overall the planar voids are generally *c.* 0.4–0.5 mm long with a maximum length of *c.* 4.0 mm and the vughs from the possible seed inclusions are *c.* 1.0 mm long and 0.5 mm high and are roughly semi-circular. The voids do not seem to have any preferred orientation.

Groundmass

The groundmass appears to be homogeneous, although what appears to be the intentional addition of organic temper gives the groundmass a distinctive texture. The colour of the groundmass is orange/brown at the margins and black to black/brown at the core (PPL $\times 40$) and

orange/red at the margins and black to black/brown at the core (XP $\times 40$). The groundmass is optically inactive.

Inclusions

c:f:v 10 μ m 10:80:10. Overall the inclusions seem to be poorly sorted with a modal size of *c.* 0.15 mm and a maximum size of *c.* 4.0 mm (if one takes voids from organic temper as an inclusion), and are rounded to very angular in shape.

Coarse Fraction, ≥ 0.1 mm

Dominant: clay pellets, rounded to sub-rounded and laths, generally *c.* 0.15–0.3 mm, max. *c.* 1.0 mm.

Frequent: monocrystalline Quartz, sub-angular to well-rounded, generally *c.* 0.2–0.3 mm, max. *c.* 2.0 mm.

Common: opaques (Iron oxide), rounded to sub-rounded, generally *c.* 0.1–0.2 mm, max. *c.* 1.0 mm.

Few: organic temper (straw and seeds), visible now as voids, with some original matter and secondary lime deposition into burnt out organics visible in the voids.

Fine Fraction, < 0.1 mm

Frequent: monocrystalline quartz, rounded to angular; clay pellets, rounded to angular.

Common: opaques (iron oxide), rounded to sub-rounded.

Comments

This fabric certainly appears to have been heavily tempered with relatively coarse organic material and was made from a sedimentary clay, consistent with a Dakhleh provenance. Given the optical activity of the groundmass and the survival of some organic remains in the voids, it does not appear that the vessel from which this sherd came was fired at a high temperature, probably no more than 700–750°C.

IX. NILE SILT (Fig. 34r)

Samples

Standard: 19

Microstructure

This fabric has few voids overall, comprised of very few meso to mega planar voids, rare meso to macro channels, rare micro to macro vesicles and rare meso to mega vughs. Overall the voids are generally *c.* 0.3–0.6 mm with a maximum size of *c.* 4.0 mm. It is not possible to determine if the voids have any preferred orientation.

Groundmass

The groundmass appears to be homogeneous. The colour of the groundmass is orange/brown at the margins to black at the core (XP $\times 40$) and brown at the margins to black at the core (PPL $\times 40$). The groundmass is optically active.

Inclusions

c:f:v 10 μm c. 20:70:10. Overall the inclusions are moderately well sorted with a modal size of c. 0.2 mm and a maximum size of c. 2.5 mm, and are well rounded to very angular and lathlike in shape.

Coarse Fraction, ≥ 0.1 mm

Common: monocrystalline quartz, angular to well-rounded, generally c. 0.15–0.25 mm, max. c. 0.6 mm; biotite mica, laths, generally c. 0.1–0.2 mm, max. c. 0.8 mm.

Few: Gypsum/anhydrite, angular and blocky, generally c. 0.8–1.4 mm, max. c. 2.5 mm; limestone (micrite), sub-angular to sub-rounded, generally c. 0.2–0.3 mm, max. c. 1.2 mm.

Very few: Muscovite mica, laths, generally c. 0.1–0.2 mm, max. c. 0.3 mm; clay pellets, sub-rounded to well-rounded, generally c. 0.1–0.15 mm, max. c. 0.3 mm; opaques (iron oxide), sub-rounded to well-rounded, generally c. 0.1–0.15 mm, max. c. 0.3 mm.

Very rare: Pyroxene or clinopyroxene, sub-rounded to rounded, generally 0.1–0.15 mm.

Fine Fraction, < 0.1 mm

Frequent: Monocrystalline quartz, sub-angular to well-rounded; biotite mica, laths.

Few: Clay pellets, sub-rounded to well-rounded; opaques (iron oxide), sub-rounded to well-rounded.

Rare: Muscovite mica, laths; pyroxine or clinopyroxene, rounded; olivine, rounded.

Comments

Based on the mineralogy of the section, it appears that this sample comes from a vessel produced from a Nile Silt

clay. It has very large, blocky fragments of an evaporate (gypsum, anhydrite or calcite) that were probably added to the paste as a filler by the potter. The presence of a high proportion of biotite mica and the presence of muscovite mica, pyroxene and olivine also supports the identification of a Nile Silt (Bourriau *et al.* 2000). Although these minerals can occur in sediments found in Dakhleh, the proportion of them and other textural features, do not support a Dakhleh provenance. The thin section is quite similar to the Nile Silt B1 sherd that was analysed by Eccleston (2002, 64–5) and discussed by Hope (2002, 48).

Notes

- 1 The content in section 6.2 has been prepared by Mark Eccleston based on the analysis of 49 samples, nine of which come from Kharga Oasis and the remainder from Dakhleh. Included in section 6.2 are descriptions of all fabric groups which include Dakhleh samples with the exception of fabric Group X (Table 10), for which the original analysis could not be completed. The sample selection from Dakhleh is considered to form a representative cross-section of material found in the Bashendi and Sheikh Muftah collections.
- 2 While the ‘Saharan Culture’ was never published in full, additional notes and illustrations produced by the excavators and kept with the Egyptian Exploration Society have been examined (pers. observ., July 2003). Comparisons could be drawn between the Findspot 1 pottery and the ‘impressed with dot patterns’ pottery based on photos labelled ‘Sn.S.2–3’, and several examples can be seen in the published photos (Mond and Myers 1937, Pl. LXXIV.3:182–93).
- 3 See also comments by Riemer and Schönfeld (2010, 737–8, 745, Fig. 15.3–4) on the ‘Mat-impressed’ finds from Abu Gerara and Djara, and comments by Muntoni and Gatto (2014, 457) on similar material from Ain el-Raml in Farafra. The impressed decoration on the vessel from Loc. 135 is not to be confused with the decoration on Loc. 212, discussed below.

Chapter 7

Conclusions

Through detailed characterisation this study has brought the analysis of pottery into closer alignment with the long-term work conducted on the early and mid-Holocene periods. Confirming the presence of Hope's (2002) two main pottery traditions has assisted in defining further the material record produced by the Bashendi and Sheikh Muftah cultural units and the sub-units identified therein by McDonald (1993; 1998; 2002a; 2013; 2016). A firmer understanding of the material record also offers inroads to examine in finer detail social and economic practices in the oasis during late prehistory, in response to both internal and external drivers for change. While full consideration of these factors will necessarily form directions for future research, some general points are presented here as a means of concluding the study, beginning with a brief review of the analysis.

7.1 Pottery variation and classification: reaching a compromise

Central to the analysis remains the concept of variation between ceramic objects and how this changed over time. The spectrum of variation is broad, with a collection that includes 33 fabrics, five separate surface treatments, four combinations of surface treatment, which when cross-tabulated produces 80 wares. Additional to this is the shape data, comprising two vessel classes (restricted and unrestricted) divisible into seven sub-classes, as well as three size categories. Altogether, this resulted in more than one hundred ware-shape permutations, which complicated attempts to determine subtle trends within the collection. In response to this, several of the more prominent ware-shape combinations were highlighted in section 5.4 to help define the evolution of the local pottery traditions.

Coming to terms with the range of variation requires some concession that the classification system is quite rigid in parts, at least insofar as some of the fine-grained categories of analysis. This does not hold for all categories and some, like the single 'decoration' category of surface treatment, will be too broad for specialists working

on this feature of ceramics. The rigidity concerns particularly the fabrics, several of which are closely related and, realistically, may present technical divisions that went largely unnoticed by non-specialist potters. Specific reference is made here to the fine sand-and-shale examples, the difference between which can be slight and sometimes imperceptible to the naked eye. This said, the purpose for maintaining strict categories was to develop a system capable of detecting minor variations in fabric through which technical/functional components could be explored (e.g. the relevance of inclusion size and type on the mechanical strength and/or thermal shock resistance of the fabric; see below on this point). While a more flexible system of classification would facilitate ease in sorting and grouping the fabrics, it would also risk glossing over important data that point to nuanced and discrete patterns in production. In stating this, it is acknowledged that increased flexibility would be helpful in matching the Dakhleh pottery with broader fabric categories used elsewhere for characterising the Western Desert pottery (e.g. the EK3B fabric category identified by Riemer 2011).

The diversity recognised in the collection raises important questions about the state of the craft. Pottery-production during the mid-Holocene was an emerging technology, not yet incorporating the wheel or firing kiln, or bound by workshop regulations or industry standards. Manufacturing techniques and material refinements are less strictly defined under such conditions, and production for the early oasis inhabitants likely involved a process of trial-and-error, partly motivated by new applications for the vessel and made workable through practice and improvements in the potters' skillsets.

During the later period of the mid-Holocene diversity in manufacturing techniques and materials became more pronounced commensurate with an increase in the scale of production. A broader range of fabrics with both coarser and finer versions of the standard pastes were being produced regularly, and surface treatments too demonstrated greater variation particularly in the use of

texturing. The physical dimensions of the vessels also transformed over time with an increase in size matched by the variety in shape, alongside the construction of new types of pottery objects. The truncated cones and spoon-shaped objects highlight a growing understanding of the fictile possibilities of the craft while the scrapers, perforated discs and token-shaped objects demonstrate an inclination towards the re-use of finished vessels, or parts thereof, for secondary applications.

7.2 Towards a better understanding of the early and mid-Holocene cultural units

The developments in oasis pottery-production can be matched broadly to patterns of behaviour among the early and mid-Holocene oasis inhabitants. In stating this, it is necessary to reiterate that the early Holocene Masara groups were not pottery producers, which is curious as they were almost certainly aware of the technology through connections with other desert cultures. There is no reason to assume that the finds from Loc. 076 were not brought into the oasis during the early Holocene from the south, possibly the Nabta-Kiseiba region, either by local groups or people with whom the Masara interacted. Contacts between the Masara and the ceramic-bearing Early Neolithic groups from the south have been suggested on the grounds of shared artefacts including bladelets and large endscrapers (McDonald 2003, 53–7; 2007, 37; Wendorf and Schild 2001, 654).

Why the Masara did not produce pottery remains unclear. Possible reasons have been offered elsewhere (Warfe 2006) and may relate to incompatibilities with technological organisation, settlement patterns and/or the demands of mobility. That the Masara A/B toolkit is considered expedient, rather than curated (McDonald 2009, 9), hints at a technological organisation prioritising low-investment technologies over high-investment technologies, such as pottery (Brown 1989). But this does not account for the Masara C groups, who demonstrate a more settled lifestyle in the Southeast Basin, and one that involved the production of curated tools. This presents at least two possibilities: that the early Holocene occupants of the oasis were aware of pottery but chose not to take it up because it served no immediate purpose, or that it conflicted with their existing technological and organisational strategies. Alternatively, the lines of contact with neighbouring regions may not have been sufficiently protracted to see the transmission of the technology, only the finished product. In any event, pottery was not produced on an industrious scale in the southern Western Desert (Nelson and Associates 2002), or for that matter anywhere else local at this time (Gehlen *et al.* 2002; McDonald *et al.* 2005, 6; Muntoni and Gatto 2014) and we should not necessarily expect the technological know-how to be circulated alongside the vessel itself.

Pottery was first produced in the oasis with the Bashendi A sub-unit sometime after 6400 cal. BC. The

technology was almost certainly introduced as part of a broader tradition of ‘undecorated’ pottery that spread throughout the Western Desert from the late seventh millennium cal. BC onwards (Kuper 1995; 2002; Riemer 2000, 29; Gehlen *et al.* 2002; Nelson 2002a, 33; Warfe 2003b, 84–5; 2008, 254–76). Whether this tradition derived ultimately from the Khartoum-related pottery is possible, though difficult to demonstrate (Kuper 1995, 135; Riemer and Jesse 2006; Warfe 2008, 259–61). The absence of decoration could be explained as something that was phased out for any number of reasons as the tradition migrated northwards. It is also notable that the undecorated pottery emerged in the Western Desert at roughly the same time as the first ‘proofs’ of domesticated livestock arrived from southwest Asia (Close 2002; di Lernia 2013) – a potential connection that requires a focussed investigation (Warfe 2008, 264–66).

Pottery-production began in the oasis as most new technologies might, in small numbers to meet limited demands, whatever these were, before its broader applications were recognised, and as a relatively homogenous artefact type in terms of materials used, construction techniques, and the size, shape and finish of the final product. The lack of decoration is unusual for an early pottery tradition (cf. Barnett and Hoopes 1995 *passim*), especially as ‘extensively’ decorated wares had been circulating across north Africa for at least two millennia by this stage (Close 1995; Huysecom *et al.* 2009; Jesse 2010; Jórdeczka *et al.* 2011). Despite the presence of imports in the Dakhleh collection from beyond the Western Desert, the local pottery seems to have developed at its own pace and in accordance with a regional desert tradition (Kuper 1995; 2002; Gehlen *et al.* 2002; Nelson 2002c, 6–7; McDonald *et al.* 2004, 7; Riemer and Schönfeld 2010; Muntoni and Gatto 2014).

As pottery was appearing more commonly in the region it is striking that so few examples have been recovered from Bashendi A sites. It is difficult, in fact, to understand how a technology persisted for so long in the oasis in such low frequencies. Possibly, this was due to the short-term nature of site occupation, or perhaps the extreme care taken in maintaining ceramic vessels once produced. Even more perplexing is that the remains of a single pot were recovered from among the 200 hut circles located on Loc. 270, the Bashendi A site that provides the most concentrated indication for sedentary activity in the oasis at this time (e.g. McDonald 2009, 10). As other Bashendi A sites with no recorded architecture have yielded the remains of several vessels, such factors challenge the assumption that settled activity was a necessary precondition for pottery-production (see below).

To a similar degree, the limited number of pots per site warns against relying on more traditional explanations for the beginnings of the technology. Dakhleh offers good grounds to decouple the emergence of the craft

from the culinary hypothesis and arguments for resource intensification (e.g. Rice 1999), to search for other reasons, more closely connected to Western Desert practices and the developments discussed in relation to other artefact categories (McDonald 2008; Warfe forthcoming b).

With the Bashendi A, and even more so with the later Bashendi B, there is evidence for a growing and diversified material assemblage that includes elaborate objects and items produced from rare or exotic raw materials (e.g. calcite labrets and worked marine/riverine shell). These items imply a shift towards the production of specialised ('competitive/prestige') objects, considered symptomatic of increased levels of complexity in which the material culture is deeply embedded within the social practices and boundary formation on the intra- and inter-group level (McDonald 2008; 2016). As pottery emerged in this context, this too would fit neatly into a newly developed category of specialised objects given its relatively high production costs and suitability for elaboration, specifically decoration (Warfe forthcoming b). Setting pottery apart is its obvious practical container function which was perhaps incorporated into ritual activities as a serving or short-term storage implement, taking on importance as a material object through integration with the activity.

The limited quantity of ceramic remains recovered from Bashendi B contexts indicates the continued manufacture of pottery in the oasis on a minimal scale during the sixth and fifth millennia cal. BC. The Bashendi B vessels differ little to those of the Bashendi A period. Both are characterised by predominantly fine fabrics, thin walls, and smooth or compacted surfaces. The assumption that Bashendi A vessels were probably small or medium-sized and produced with fairly basic shapes is supported by Bashendi B examples, among which there are no large vessels, and shapes are mostly of the unrestricted subclass 1 or restricted subclass 4.

A notable feature of the Bashendi B pottery is the production of particularly low-fired examples that are easily broken by hand. It is hard to imagine the original vessels being put to the domestic tasks associated with processing foodstuffs (e.g. heating, mixing, stirring). More likely, these vessels were used for less rigorous purposes, such as serving containers or for short-term storage. The smaller average size of Bashendi B vessels supports this interpretation, and so too the general absence of obvious use-wear indicators.

The relationship between pottery-production and settlement patterns is complicated with the Bashendi B. The apparent abandonment of long-term settlement activity in favour of more mobile practices is most likely connected to the permanent adoption of domesticated livestock by the oasis inhabitants and the need to pasture (McDonald 1998, 131). Although pottery was still produced in limited numbers, the marginal increase in scale from the Bashendi A period matched with increased

mobility is unexpected, and represents an inversion of the assumed relationship between the craft and settlement pattern (e.g. Eerkens 2008, 309–12; see also Riemer 2011, 268–9). While the low frequency of vessels was perhaps more conducive to the mobile lifestyle, the low-firing is not ideal and increases susceptibility to breakage which is already heightened through practices of movement. This incongruity is difficult to reconcile, though evidently the settlement patterns were not prohibitive for the continuation of this craft. The small size and careful handling of pots would have mitigated against unintended breakage and evidence for repair holes demonstrates the curation of vessels. In fact, the production of small, slightly restricted vessels would have been especially well-suited for the short-term storage and serving of secondary products (blood, milk) produced from the livestock and common to the consumption practices of herders (Grillo 2014).

Decoration is rare among the Bashendi B examples, though notable with examples of woven mat pottery and rim-top decoration from Loc. 212, and with the handful of locally made sherds from Loc. 074 bearing rim-top decoration and complex patterns. Locality 074 is tentatively dated towards the end of the Bashendi B period (McDonald 1999b, 123) and it is around this time that decoration seems to have flourished momentarily in local production if we can include the few examples of rim-top milling and a single example of the complex pattern recorded from the Early Sheikh Muftah Locs 035 and 135. But the practice was short-lived and restricted in frequency, and ultimately decoration cannot be considered a defining feature of pottery-production in Dakhleh for the period under investigation. While this limits the range of attributes that may be used to determine cultural influence in the desert, it also raises questions of intentionality, and whether there were reasons to eschew decorating pots, perhaps for purposes of boundary formation or other social practices (Warfe forthcoming b).

The continued production of pottery into the Sheikh Muftah period (c. 3800 cal. BC) with thin walls, smooth surfaces and fine fabrics indicates the division with the Bashendi pottery tradition is not strictly demarcated. Indeed, there are several overlapping traits shared between the Bashendi and Sheikh Muftah which are neatly captured in Hope's (2002) reference to a *transitional* phase. While this is an instructive way to think of the Early Sheikh Muftah, regrettably it cannot be determined how long this transition lasted.

By the time the Sheikh Muftah unit was in full flight, notable changes had occurred in the local production. Vessels were produced in larger sizes, the textured surface treatment had become a defining feature, and so too the use of coarse shale as a fabric inclusion. Changes in construction were also occurring, and particularly conspicuous are the indicators that vessels were hastily finished: undulating rims, uneven wall thickness and

asymmetric profiles. No longer was there an emphasis on producing small, symmetrical vessels with smoothed or compacted surfaces, though such vessels did continue in production.

The significant increase in the quantity and variation in pottery that signifies the Late Sheikh Muftah industry points to a technology adapting to major changes in subsistence and settlement. The impression of the Sheikh Muftah outlined in two important papers (McDonald *et al.* 2001; McDonald 2002a) is one of a fairly 'hardscrabble' existence. Skeletal evidence for porotic hyperostosis and enamel hypoplasia indicates malnutrition, and the impression of economic hardship is supported by the maximal fragmentation of animal bones for full nutrient extraction. Churcher (1983, 183) posits that the bones were probably splintered for fitting into pots so that the marrow could be boiled out.

The large, clunky-looking vessels found on Late Sheikh Muftah sites may bear witness to such practices which, given the commonality of such finds, could have been fairly widespread. But care must be taken in characterising Late Sheikh Muftah economic practices through their pottery. While it is true that a sizeable quantity of the pottery appears to have been constructed in a slapdash manner, some finer examples – i.e. smaller vessels with thin walls and even surfaces – were also produced. Curiously, some of these were made with the coarse shale 2B fabric. While more research needs to be undertaken in this area, such finds suggest that coarse inclusions were not necessarily intended for practical purposes such as improving the strength or thermal shock resistance of the vessel (Warfe 2015). More broadly, this cautions against pursuing strictly functional explanations for developments in the making of local pottery.

Lastly, a notable development in the Sheikh Muftah pottery tradition is the manufacture of the truncated cones and perforated discs. While the precise function of these items remains unclear (Riemer and Kuper 2000, 99; Gatto 2002b, 56; Riemer 2004, 985; 2013, 82), the caching of such objects at strategic locations in the open desert suggests a practical role that assisted in human movement across the region (Gatto 2002b, 59; Riemer 2004, 976; 2011, 268–9; 2013, 80–6). The number of cones and discs found in the DOP concession zone are so far few, but clearly signal an engagement in desert travel by the Sheikh Muftah. This is reflected also by examples found on sites neighbouring the oasis (e.g. Riemer 2011).

It is notable that a limited quantity of truncated cones recovered from the desert bear potmarks applied mostly through post-firing (Riemer 2004, 981–2; 2011, 71–3). Although this is not observed among examples in the Dakhleh collection, an apparent potmark is recorded on a sherd from Loc. 134 and there is accumulating evidence to investigate in detail interconnections between the Late Sheikh Muftah groups and the developing Egyptian state.

By the mid-third millennium, Dakhleh had become the stage for cultural interaction with permanent Egyptian sites established at 'Ain el-Gazzareen (Mills 2002; 2012), Mut al-Kharab (Hope 2007; Hope and Pettman 2012), and 'Ain Asil (Giddy 1987, 174–205; Soukiassian *et al.* 1990) along with a handful of hilltop sites distributed largely in the eastern part of the oasis, probably constructed to monitor traffic (Kaper and Willems 2002; Pettman *in press*; see also Riemer *et al.* 2005). The reasons for the Egyptian influx into the Western Desert are not known for certain (Hope 2007, 405–8), but likely to be for strategic, resource-driven or possibly ideological purposes relating to the expansion of the early state (J. Darnell 2002, 150–1; D. Darnell 2002, 168–9; Kuhlmann 2002, 128–9; Kuper 2003, 375–6; Kuper and Förster 2003, 26; Wagner and Heller 2012, 350; Riemer 2013, 84–6; Hope *et al.* *in press*).

In terms of social relations between the indigenous inhabitants of Dakhleh and the Nile Valley newcomers, it has been suggested that these may have been largely peaceful (Mills 1999, 220; Hope 2007, 407). While there exist ceramic indicators for the cross-fertilisation of cultural traits (Hope and Tangri 1999, 221, 224; Hope *et al.* 2006, 38), the full impact of the Egyptian presence on the Sheikh Muftah is uncertain, and has only recently become the focus of targeted studies (Warfe 2005; Hope and Pettman 2012; Jeuthe 2014; Hope *et al.* *in press*; Pettman *et al.* *forthcoming*). The ongoing study of the pottery and other artefacts from sites across the oasis promises to shed light on this issue.

7.3 Future directions for study

Through its systematic approach to analysing the early Dakhleh pottery this monograph sets the foundations upon which more detailed studies on social practices can be constructed; these are becoming more central to our research interests (McDonald 2008; 2013; 2016; Warfe *forthcoming b*). Further investigation on the oasis pottery is envisaged as part of an expanded research program that incorporates a broader sweep of analytical techniques to complement more in-depth questions involving the material culture.

The first steps in this direction are underway with research exploring the physical properties of the Dakhleh pottery and the raw materials used in construction (Warfe 2015; 2016; *forthcoming a*). These studies seek to gain insight into the decision-making processes of the ancient potters as a way of investigating the variation seen in the ceramic record. Experimental testing on the shale-tempered fabrics has been applied to assess the strength and thermal resistance properties of this inclusion, with the view to understanding the increased use of coarse shale and its suitability for rigorous domestic purposes. Similarly, experimental testing on the thermal co-efficiencies and durability of plain, compacted and textured surface treatments has gone some way in understanding the increase use of the latter treatment over

time (Warfe 2016). Although these studies are limited in scope, they offer detail on the physical properties of the pottery which helps to inform the research on vessel production and consumption.

This field of ceramic analysis is beginning to attract more attention in ancient northeast African studies (e.g. Bader and Ownby 2013; Dunne *et al.* 2016) and can build on the few, important statements that have sought to associate pottery with subsistence and settlement activities. This include Riemer's (2011, 268–70) discussion on desert mobility, the various statements on resource intensification and broadening the food spectrum (Zedeño 2002, 61–3; Garcea 2006, 201, 213; Jesse 2010, 221; Jórdeczka *et al.* 2011, 111), and Haaland's (1995; 2006; 2007) more detailed argument correlating pottery with sedentary adaptations and food processing (see also Caneva 1988, 368). A better understanding of ceramic production and consumption is also important in understanding social practice. In her seminal publication on the early pottery of north Africa, Close (1995, 28) argued that the infrequency of

desert examples implies pottery's relevance in the social and symbolic spheres, rather than in cooking, storage or holding water (see also Barich 2013, 447–8). While the point is that ceramic vessels served a special purpose, the separation of applications is perhaps misleading in properly assessing the role of pottery, the physical properties of which should be examined for how they interlink with social practices (e.g. Warfe forthcoming b).

Early and mid-Holocene northeast Africa is seen as a period of increasing social dynamism and creativity (McDonald 2008; 2016; Holdaway *et al.* 2016), with the artefactual record serving as an essential medium through which social practices are constructed and mediated. Artefacts are inexorably attached to the formation of cultural memory (Dittrich 2013) and the cultural strategies (Wengrow *et al.* 2014) that shaped the period. As one of the key artefact categories remaining from this time, pottery serves as a vital tool to gain insight into these practices. An expanded research program that incorporates innovative analytical and conceptual approaches offers a new way forward for ceramic studies.

Appendix

Site collections

The following list identifies the pottery finds (by code) from 96 registered sites and five ‘findspots’ (unregistered sites) in the oasis. The latter are included to define further the range of material found in the oasis. All sites are ordered according to site CVC¹ number, followed by the grid index and accompanying details on the approximate location of the site.

Loc. 002 (33/390-I9-1): northwest Dakhleh (Fig. 18)

The remains of eight vessels were recovered from this site. This includes three examples of the Hp1 ware, one of which has a subclass 4 shape (Pl. 9a), one example of the Hp2 ware with a subclass 4 shape (Pl. 9b), two examples of the Hx1 ware both with subclass 1 shapes (Pl. 9c–d) and an example of the Hx2 ware with a subclass 1 shape (Pl. 9e). An example of the 7C fabric was also recorded.

Loc. 005 (33/405-B5-1): northwest Dakhleh (not mapped)

The single rimsherd recovered from this site is classified as an Hmd4 ware with a subclass 2 shape (Pl. 9f).

Loc. 008 (33/390-H9-1): northwest Dakhleh (Fig. 18)

The single rimsherd recovered from this site is classified as an Hp1 ware with a subclass 4 shape (Pl. 9g).

Loc. 012 (33/390-I9-3): northwest Dakhleh (not mapped)

The single sherd from this site is classified as an Hp8 ware.

Loc. 028 (33/390-I9-2): northwest Dakhleh (not mapped)

The single sherd from this site is classified as an Hp6 ware.

Loc. 035 (31/405-G6-1): central Dakhleh (Fig. 18)

The remains of 25 vessels were recovered from this site. This includes four examples of the Hp1 ware, two of which have subclass 4 shapes (Pl. 9h–i) while a third has a subclass 6 shape (Pl. 9j); three examples of the Hp2 ware, two of which have subclass 1 shapes (Pl. 9k–l);

one example of the Hp3 ware with a subclass 1 shape (Pl. 9m); one example of the Hp4 ware with a subclass 4 shape (Pl. 9n); one example of the Hp6 ware with a subclass 1 shape (Pl. 9o); and one example of the Hp14 ware. A few compacted wares were also found including five examples of the Hm1 ware, two of which have subclass 1 shapes (Pl. 9p–q); and single examples of the Hm2, Hmc1 and Hm5 wares, the latter with a subclass 1 shape (Pl. 9r). Five decorated sherds were also found on this site, three of which are examples of the Hd1 ware (Pl. 9s–u), and one example each of the Hd2 and Hd3 wares (Pl. 9v and 10a). The collection also includes an example of the Hx2 ware with a subclass 4 shape (Pl. 10b).

Loc. 047 (31/405-K10-3): central Dakhleh (Fig. 18)

The single rimsherd from this site is classified as an Hp2 ware with a subclass 4 shape (Pl. 10c).

Loc. 048 (31/405-K10-5): central Dakhleh (Fig. 18)

The remains of eight vessels were recovered from this site. This includes two examples of the Hp1 ware, both with subclass 4 shapes (Pl. 10d–e); four examples of the Hp2 ware with shapes from subclasses 1, 2 and 4 (Pl. 10f–i); one example of the Hp6 with a subclass 6 shape (Pl. 10j); and the only example of the Hd8 ware to be found (no illustration available).

Loc. 059 (31/405-M10-3): central Dakhleh (Fig. 18)

The remains of 12 vessels were recovered from this site. Included are three examples of the Hp2 ware, one with a subclass 1 shape (Pl. 10k) and another with a subclass 4 shape (Pl. 10l); two examples of the Hp6 ware; and an example each of the Hp8, Hp26 and Hp3 wares, the latter with a subclass 1 shape (no illustration available). The site collection also includes an example each of the Hx1 and Hx2 wares both with subclass 4 shapes (Pl. 10m–n), an example of the Hc9 ware and the only Hmd5 ware with a subclass 5 shape (for illustration see Hope 2002, Fig. 7c).²

Loc. 062 (31/405-G7-4): central Dakhleh (Fig. 18)

The single rimsherd recovered from this site is an Hp1 ware with a subclass 1 shape (Pl. 10o).

Loc. 064 (31/405-G6-2): central Dakhleh (Fig. 18)

The remains of an Hp21 ware were recovered from this site.

Loc. 068 (31/420-F10-2): central Dakhleh (Fig. 18)

Two sherds were collected from this site. One is an example of the Hm13 ware with a subclass 4 shape (no illustration available) and the other an Hp1 ware with a subclass 4 shape (Pl. 10p).

Loc. 069 (31/420-D10-3): central Dakhleh (Fig. 18)

Two perforated discs and the remains of 10 vessels were recovered from this site. The discs are produced from Hp2 and Hp4 wares (Pl. 10q–r). The remainder of the collection includes three examples of the Hp1 ware, two of which have subclass 1 shapes (Pls 10s and 11a) while the third has a subclass 2 shape (Pl. 11b); three examples of the Hp2 ware, two of which have subclass 1 shapes (Pl. 11c–d); and single examples of the Hp3 and Hp4 wares, the latter with a subclass 1 shape (Pl. 11e). Examples of the 8A fabric from two separate vessels were also found, one of which has a subclass 7 shape (Pl. 11f).

Loc. 070 (31/420-F9-1): central Dakhleh (Fig. 18)

The remains of four vessels were recovered from this site. Included are two examples of the Hp2 ware, one with a subclass 2 shape (Pl. 11g) and the other a subclass 5 shape (Pl. 11h), an example of the Hm13 ware with a subclass 6 shape (Pl. 11i), and an example of the Hp24 ware.

Loc. 071 (31/420-E10-1): central Dakhleh (Fig. 18)

The remains of 10 vessels and a perforated disc were recovered from this site. The disc is classified as an Hp2 ware (Pl. 11j). The remainder of the site collection includes four other examples of the Hp2 ware with shapes from subclasses 1, 2 and 4 (Pl. 11k–n); and single examples of the Hm1 ware with a subclass 4 shape (Pl. 11o), the Hm12 ware with a subclass 1 shape (Pl. 11p), the Hm7 ware with a subclass 4 shape (Pl. 11q), the Hx1 ware with a subclass 4 shape (Pl. 11r), the Hx2 ware with a subclass 4 shape (Pl. 11s) and the Hmx1 ware with a subclass 5 shape (Pl. 11t).

Loc. 072 (31/420-D9-1): central Dakhleh (Fig. 18)

The remains of 10 vessels were recovered from this site. Included are two examples of the Hp2 ware, and one example each of the Hp1 ware with a subclass 1 shape (Pl. 12a), the Hp3 ware, the Hp22 ware with a subclass

2 shape (Pl. 12b), the Hp24 ware with a subclass 3 shape (Pl. 12c) and the Hx2, Hm7 and Hp14 wares. Also in the collection is an example of 4C fabric with a subclass 4 or 5 shape (Pl. 12d).

Loc. 073 (31/420-C10-1): central Dakhleh (Fig. 18)

The remains of an Hp6 ware with a subclass 4 shape (Pl. 12e) and Hmd1 ware (Pl. 12f) were recovered from this site.

Loc. 074 (31/420-C10-2): central Dakhleh (Fig. 11)

The remains of 12 vessels were recorded from this site, the majority of which are small rimsherds that display decoration on the exterior surface. The collection includes two examples of the Hd1 ware (Pl. 12g–h), three examples of the Hd2 ware (Pl. 12i–k), one example of the Hd3 ware (Pl. 12l) and one example of the Hmd1 ware (Pl. 12m). This latter example is the only find to preserve decoration on both surfaces. Also included in the collection are examples of the Hm1, Hp1, Hp2 and Hp6 wares.

Loc. 076 (off grid): northwest Dakhleh (Fig. 8)

The two sherds recovered from this site are both examples of the Hp12 ware and are presumably from the same vessel.

Loc. 077 (off grid): northwest Dakhleh (Fig. 11)

The single sherd recovered from this site is an example of the Hm2 ware with a subclass 4 shape (Pl. 12n).

Loc. 088 (31/420-H7-2): central Dakhleh (Fig. 18)

Two sherds were recovered from this site and are examples of the 1A and 1B fabrics.

Loc. 093 (30/435-J2-1): southeast Dakhleh (Fig. 18)

The remains of three vessels were recovered from this site. One of these is an example of the Hp2 ware with a subclass 4 or 5 shape (Pl. 12o), another is an example of the Hm2 ware with a subclass 4 shape (Pl. 12p) and the third is an example of the Hx2 ware with a subclass 1 shape (Pl. 12q).

Loc. 094 (30/435-J5-1): southeast Dakhleh (Fig. 18)

The remains of a vessel and three perforated discs come from this site. Two of the discs are Hp2 wares (Pls 12r and 13a) while the third is an Hp3 ware (Pl. 13b). The vessel is an example of the Hx3 ware with a subclass 1 shape (Pl. 13c).

Loc. 096 (30/435-F6-1): southeast Dakhleh (Fig. 18)

Two sherds were recovered from this site, one of which is an Hp1 ware with a subclass 4 shape (Pl. 13d) and the other an Hp3 ware with a subclass 1 shape (Pl. 13e).

Loc. 098 (31/435-B4-3): central Dakhleh (Fig. 18)

The remains of four vessels were recovered from this site. This includes an example of the Hp1 ware with a subclass 1 shape (Pl. 13f), an example of the Hp2 ware

with a subclass 1 or 2 shape (Pl. 13g), and an example each of the Hp15 ware and the 1D fabric.

Loc. 100 (31/420-P6-1): central Dakhleh (Fig. 18)

The remains of five vessels were collected from this site. Included are two examples of the Hp2 ware, one of which has a subclass 1 shape (Pl. 13h); two examples of the Hp3 ware both with subclass 1 shapes (Pl. 13i-j); and an example of the 6B fabric.

Loc. 103 (32/435-M10-1): northeast Dakhleh (Fig. 11)

The remains of three vessels were collected from this site. One of these is an example of the Hp17 ware, while the other two are poorly preserved examples of the 4B and 4E fabrics.

Loc. 104 (31/420-M9-2): central Dakhleh (Fig. 11)

The remains of three vessels were recovered from this site. One of these is an Hm5 ware with a subclass 4 shape (Pl. 13k), while the other two are examples of the Hp6 ware and the 7B fabric.

Loc. 105 (30/420-1-1): central Dakhleh (Fig. 18)

The remains of 16 vessels were recovered from this site. Included are four examples of the Hp1 ware with subclass 1 and 4 shapes (Pl. 13l-n), three examples of the Hx1 ware with subclass 1 and 4 shapes (Pls 13o and 14a), two examples of the Hx2 ware, one with a subclass 1 shape (Pl. 14b), two examples of the Hp10 ware, one with a subclass 2 shape (Pl. 14c), and an example each of the Hp23 ware, the Hx4 ware with a subclass 1 shape (Pl. 14d), the Hxd1 ware, and Hd7 ware with a subclass 3 shape (Pl. 14e). The 8A fabric is also represented by a small collection of badly preserved sherds.

Loc. 108 (30/435-B3-2): central Dakhleh (Fig. 18)

The remains of seven vessels were recovered from this site. Included are two examples of the Hp2 ware, one with a subclass 1 shape (Pl. 14f), and an example each of the Hp1 ware with a subclass 1 shape (Pl. 14g), the Hp23 ware with a subclass 4 shape (Pl. 14h), and the Hp25 ware with a subclass 3 shape (Pl. 14i). An example each of the 4E and 8A fabrics was also recorded.

Loc. 109 (30/435-B3-3): central Dakhleh (Fig. 18)

The rimsherd recovered from this site is an example of the Hx8 ware with a subclass 1 shape (Pl. 14j).

Loc. 114 (31/435-A7-1): central Dakhleh (Fig. 18)

The remains of four vessels were recovered from this site. Three of these are examples of the Hp2 ware – two with subclass 1 shapes (Pl. 14k-l) and the third with a subclass 4 shape (Pl. 14m) – and the fourth find is an example of the Hp7 ware with a subclass 1 shape (Pl. 14n).

Loc. 115 (31/435-A6-2): central Dakhleh (Fig. 18)

The remains of three vessels were recovered from this site. Included is an example of the 1B fabric with a subclass 1

shape (Pl. 15a), and two examples of the Hp3 ware, one of which has a subclass 4 shape (Pl. 15b).

Loc. 116 (31/435-A6-3): central Dakhleh (Fig. 11)

The remains of seven vessels were recovered from this site. This includes five examples of the 1B fabric, three of which are plain (Hp2) one with a subclass 4 shape (Pl. 15c) and another with a subclass 5 shape (Pl. 15d); and two examples of the 1A fabric, one of which is plain (Hp1) while the other has a subclass 1 shape (Pl. 15e).

Loc. 117 (30/435-I3-1): southeast Dakhleh (Fig. 18)

The remains of four vessels and a truncated cone were recovered from this site. This includes two examples of the Hp2 ware, one of which has a subclass 1 shape (Pl. 15f) and the other appears in the form of a truncated cone (Pl. 15g); and one example each of the Hp3 ware with a subclass 1 shape (Pl. 15h), the Hp24 ware with a subclass 4 shape (Pl. 15i) and the Hx3 ware.

Loc. 119 (30/435-K3-1): southeast Dakhleh (Fig. 18)

The remains of two vessels were recovered from this site. Both are examples of the Hp2 ware with subclass 1 shapes (Pl. 15j-k).

Loc. 125 (31/435-L1-1): northeast Dakhleh (Fig. 11)

The remains of a single vessel, classified as an Hp1 ware, were recovered from this site.

Loc. 131 (30/435-M2-5): southeast Dakhleh (not mapped)

The remains of two vessels were collected from this site. One of these is identified as the Hp1 ware with a subclass 4 shape (Pl. 15l). The other is classified as the Hp8 ware with a subclass 1 shape (Pl. 15m).

Loc. 134 (30/450-B3-1): southeast Dakhleh (Fig. 18)

The single rimsherd from this site is classified as an Hd1 ware and bears the only potmark identified in the collection (Pl. 15n).

Loc. 135 (30/450-B4-1): southeast Dakhleh (Fig. 18)

Four perforated discs, one truncated cone and the remains of 23 vessels were recovered from this site. Included are four examples of the Hp1 ware with subclass 2 and 6 shapes (Pl. 15o-p); two examples of the Hp2 ware, one of which is the truncated cone (Pl. 15q) and another a disc (Pl. 16a); three examples of the Hp3 ware, two of which are discs (Pl. 16b-c) while the third is a vessel with a subclass 4 shape (Pl. 16d); one example of the Hp4 ware which appears in disc form (Pl. 16e); and one example each of the Hp11 and Hp22 wares.

The collection also comprises a number of compacted finds including five examples of the Hm1 ware, two examples of the Hm2 ware, one of which has a subclass 1 shape (Pl. 16f), and an example each of the Hm5 ware

with a subclass 2 shape (Pl. 16g) and the Hm9 ware with a subclass 4 shape (Pl. 16h). An example of the compacted-and-coated Hmc2 ware with a subclass 4 shape (Pl. 16i) was also recorded as well as a compacted-and-decorated example (Hmd1) with a subclass 2 shape (Pl. 16j). Other decorated sherds include two examples of the Hd2 ware (Pl. 16k–l) and an example of the Hd6 ware. Lastly, the collection includes examples of the Hc2 ware and the Hx2 ware with a subclass 1 shape (Pl. 16m).

Loc. 136 (30/450-B3-2): southeast Dakhleh (Fig. 18) Several thousand sherds were collected from surface and sub-surface contexts on this site, estimated to represent some 260 vessels and/or miscellaneous objects. Most finds offer information on surface treatment and roughly half provide data on shape.

The remains of 15 vessels were recorded from sub-surface deposits. In total, 46 m² was excavated across five separate areas. Two of these areas were devoid of artefacts beyond the surface layer, whereas two others (squares K13/L13 and F14–16) yielded material to a depth of 30–40 cm. Another area, squares K24–25, L25 and M25–26, produced pottery finds at a depth of almost 1 m (McDonald *et al.* 2001, 6). While it is useful to separate these finds from the surface material, they do not demonstrate a significant shift in pottery trends over time. The same wares appear in comparatively similar frequencies in both sub-surface and surface contexts, and the fact that the site is mostly deflated and has been subject to modern interference warns against relying too heavily on the integrity of these contexts. Indeed, there were instances in which sherds from sub-surface contexts could be joined with those collected from the surface.

Plain wares dominate the surface collection. Twelve examples of the Hp1 ware were found, one of which appears in the form of a scraper (Pl. 23c), while others have shapes from subclasses 1, 3, 4 and 5 (Pl. 17a, c–e and g). Fifty-two examples of the Hp2 ware were recorded. The shapes identified with these come from subclass 1 (Pl. 17h–l and n), subclass 2 (Pl. 17o–r), subclass 3 (Pl. 18a and c–f) and subclass 4 (Pl. 18g–o). A ‘token-shaped’ object and a ‘spoon-shaped’ object (Pl. 23a and k) were also found with this ware group, as was a perforated disc (Pl. 22o). Forty examples of the Hp3 ware were recorded. The shapes recorded are from subclass 1 (Pl. 19a–e and g–k), subclass 2 (Pl. 19l–n and p), subclass 3 (Pl. 20a–c) and subclass 4 (Pl. 20d–h). Also recovered were three examples of the Hp6 ware, one with a subclass 4 shape (Pl. 20i); 28 examples of the Hp7 ware with shapes from subclass 1 (Pl. 20j–n), subclass 4 (Pl. 20o–r), subclass 5 (Pl. 20s–t) and subclass 6 (Pl. 20u) in addition to a token-shaped object (Pl. 23b) and two spoon-shaped objects (Pl. 23i and l); 21 examples of the Hp8 ware with shapes from subclass 1 (Pl. 20v) and subclass 4 (Pl. 21a–b); and two examples of the Hp9 ware, one with a subclass 6 shape (Pl. 21c).

Other plain wares include an example each of the Hp10 ware with a subclass 3 shape (Pl. 21d), the Hp13 ware in the form of a spoon-shaped object (Pl. 23m), and Hp14 and Hp16 wares. Fifteen examples of the Hp24 ware were recovered, one of which appears in the form of a scraper (Pl. 23d) while others have shapes from subclass 1 (Pl. 21e), subclass 2 (Pl. 21f) and subclass 3 (Pl. 21h). Also found were three examples of the Hp25 ware, two of which have subclass 2 shapes (Pl. 21j–k); three examples of the Hp26 ware; and one example of the Hp28 ware.

Compacted wares form the second most common ware group. Twenty-four examples of the Hm6 ware were recovered including a disc (Pl. 22p), a spoon-shaped object (Pl. 23j), and vessels with shapes from subclass 1 (Pl. 21l–o), subclass 3 (Pl. 22a) and subclass 4 (Pl. 22b–d). Four examples of the Hm7 ware and an example each of the Hm1 and Hm5 wares were found, along with an example of the Hm4 ware with a subclass 4 shape (Pl. 22e).

Eighteen examples of textured wares were recorded. Ten of these are examples of the Hx2 ware, four of which have subclass 1 shapes (Pl. 22f–i), another has a subclass 4 shape (no illustration available) and one appears in the form of a scraper (Pl. 23e). Other textured finds include three examples of the Hx3 ware, one of which has a subclass 4 shape (Pl. 22j); two examples of the Hx8 ware; and an example each of the Hx1 ware with a subclass 4 shape (Pl. 22k), the Hx6 ware with a subclass 1 shape (Pl. 22l) and Hx7 ware with a subclass 3 shape (Pl. 22m).

Only four examples of coated wares were recorded from the surface. This includes two examples of the Hc7 ware and one example of the Hc1 and Hc6 wares, the latter with a subclass 6 shape (Pl. 22n). Among the collection of surface finds that did not preserve surface treatment are a few examples of the 1C, 1D, 7B and 8A fabrics. Three examples of the 1B fabric in the form of scrapers were also recovered (Pl. 23f–h).

Finds from sub-surface contexts include an example each of the Hp1 ware with a subclass 4 shape (Pl. 17f), the Hp3 ware with a subclass 1 shape (Pl. 19f) and the Hp5 ware from just below the surface on sub-square A18b–L2. An example of an Hp2 ware with a subclass 1 shape (Pl. 17m) was found on sub-square F14d–L3, and on square F16–L3 10 sherds were found, eight of which belonged to an Hp24 ware with a subclass 2 shape (Pl. 21g).

Square K13–L4 revealed a few sherds of the 7B fabric and square L13–L2 yielded a small collection of sherds from at least three vessels. Included are examples of the Hp1 and Hp8 wares both with subclass 1 shapes (Pls 17b and 20w) and the Hp24 ware with a subclass 3 shape (Pl. 21i).

Sub-squares K24–25 yielded the remains of a few vessels. In sub-square K24c–L2 eight sherds belonging to the Hp24 ware were found: sherds from the same vessel were also found in sub-squares L25c–L5/6 and K24c–L3/4

and in square K25–L2/3. Also in K24c–L2 were sherds from an Hp2 ware. In K24c–L5 three body sherds and one rimsherd were found. These have all been classified as examples of the Hp2 ware, though it is unclear whether they come from the same vessel, which seems to have a subclass 3 shape (Pl. 18b). Sub-square K25c–L3 also yielded six sherds of the Hc2 ware.

Lastly, an example of the Hm5 ware was found in sub-square L25c–L6, and squares M25–L5 and M26–L5 yielded a considerable quantity of sherds all apparently belonging to the one vessel identified as an Hp3 ware with a subclass 2 shape (Pl. 19o).

Loc. 138 (off grid): northeast Dakhleh (Fig. 18)

The remains of seven vessels were collected from this site. This includes two examples of the Hp2 ware, one with a subclass 4 shape (Pl. 24a) and one example each of the Hm3, Hm7 and Hx7 wares. There are also examples of the Hx1 ware with a subclass 4 shape (Pl. 24b) and the Hmx2 ware with a subclass 1 shape (Pl. 24c).

Loc. 139 (off grid): northeast Dakhleh (Fig. 18)

The remains of 11 vessels were recovered from this site. Included are two examples of the Hp2 ware, one with a subclass 4 shape (Pl. 24d); an example of the Hp6 ware with a subclass 4 shape (Pl. 24e); two examples of the Hp24 ware, one with a subclass 3 shape (Pl. 24f); and two examples of the Hp25 ware with subclass 1 and 4 shapes (Pl. 24g–h). Also in this site collection are single examples of the Hm1 and Hm7 wares both with subclass 1 shapes (Pl. 24i–j), the Hmc3 ware, and the Hx3 ware with a subclass 4 shape (Pl. 24k).

Loc. 143 (30/435-B6-1): central Dakhleh (Fig. 18)

The remains of six vessels were recovered from this site. This includes two examples of the Hp3 ware with subclass 1 and 4 shapes (Pls 24l and 25a), an example of the Hp24 ware and an example of the Hx2 ware with a subclass 1 shape (Pl. 25b). Examples of the 1A and 1B fabrics were also recovered, the latter with a subclass 4 shape (Pl. 25c).

Loc. 144 (30/420-P2-1): central Dakhleh (Fig. 18)

The remains of three vessels were collected from this site. This includes an Hx3 ware with a subclass 4 shape (Pl. 25d), an Hp23 ware with a subclass 3 shape (Pl. 25e) and an example of the 1A fabric.

Loc. 145 (31/420-N6-1): central Dakhleh (Fig. 18)

The remains of three vessels were collected from this site. Included are examples of the Hp7 ware, the 1B fabric and the 3B fabric with a subclass 3 shape (Pl. 25f).

Loc. 168 (31/420-M6-1): central Dakhleh (Fig. 18)

The single sherd recovered from this site is an example of an Hp1 ware.

Loc. 169 (31/420-N7-1): central Dakhleh (Fig. 18)

The single sherd from this site is an example of the 3A fabric.

Loc. 170 (31/420-N7-2): central Dakhleh (Fig. 18)

The remains of six vessels were recovered from this site. This includes an example each of the Hp1 ware, the Hp2 ware with a subclass 4 shape (Pl. 25g), the Hp3 ware with a subclass 1 shape (Pl. 25h), the Hx1 ware and the 1A and 9A fabrics without surface treatment.

Loc. 171 (30/435-B5-1): central Dakhleh (Fig. 18)

The remains of four vessels were recovered from this site. This includes single examples of the Hp23 and Hp25 wares with subclass 1 shapes (Pl. 26a–b), and the Hx2 and Hx3 wares.

Loc. 174 (30/450-F8-3): southeast Dakhleh (Fig. 11)

The remains of six vessels were recovered from this site. This includes one example each of the Hp1, Hm1, Hm2 and Hm10 wares and the 1A and 5A fabrics.

Loc. 184 (30/450-F7-5): southeast Dakhleh (Fig. 11)

The remains of five vessels were recovered from this site. This includes two examples of the Hm1 ware and an example each of the Hm2 and Hm9 wares and the 5A fabric.

Loc. 200 (30/420-C5-1): central Dakhleh (Fig. 8)

Five sherds were found on this site, four of which are from the same vessel, identified as the Hm7 ware, and the remaining sherd is an example of the 5A fabric.

Loc. 210 (30/450-F8-6): southeast Dakhleh (Fig. 11)

One sherd was collected from this site and this has been classified as an example of the Hp17 ware with a subclass 4 shape (Pl. 26c).

Loc. 212 (30/450-C6-1): southeast Dakhleh (Fig. 11)

The remains of 26 vessels were recovered from this site. Included are five examples of the Hp1 ware with shapes from subclasses 4 and 5 (Pl. 26d–e), one example of the Hp10 ware, two examples of Hp19 ware and four examples of the Hp20 ware, one of which has a subclass 2 shape (Pl. 26f).

Several compacted finds were recovered including six examples of the Hm1 ware, two of which have subclass 1 shapes (Pl. 26g–h); two examples of the Hm2 ware with subclass 4 and 6 shapes (Pl. 26i–j); and one example each of the Hm5 ware with a subclass 4 shape (Pl. 26k) and the Hmd2 and Hmd3 wares (Pl. 26l–m). The remaining finds include an example of the Hd6 ware (Pl. 2d), the Hc8 ware and some Fabric 1B sherds.

Loc. 218 (30/420-C4-2): central Dakhleh (Fig. 8)

One of the three sherds recovered from this site has been identified as Islamic (Hope and Tangri 1999, 238) and is

mentioned here only to highlight the presence of intrusive material on prehistoric sites. Another sherd is identified as an Hp2 ware, while the remaining sherd is a 2A fabric.

Loc. 220 (30/435-J9-1): southeast Dakhleh (Fig. 18)
The remains of an Hm1 ware were recovered from this site.

Loc. 221 (30/435-J6-1): southeast Dakhleh (Fig. 18)
The remains of three vessels were collected from this site, including examples of the Hp2 and Hp3 wares, and the 1B fabric.

Loc. 222 (30/435-J6-2): southeast Dakhleh (Fig. 18)
The remains of four vessels have been recovered from this site. Included are two examples of the Hx2 ware with subclass 1 shapes (Pl. 27b–c), an example of the Hp2 ware with a subclass 4 shape (Pl. 27a) and an example of the Hp3 ware.

Loc. 224 (30/405-N3-1): central Dakhleh
(not mapped)
Two small sherds were recovered, one of which is an Hp1 ware and the other an Hp2 ware with a subclass 1 shape (Pl. 27d).

Loc. 228 (30/450-A9-1): southeast Dakhleh (Fig. 11)
Contrary McDonald (1990b, 29), pottery has been found on this site, though this only comes in the form of two sherds. These appear to represent separate vessels, one of which is an example of the Hm1 ware and the other an example of Hp19 ware.

Loc. 243 (29/450-D4-1): southeast Dakhleh (Fig. 8)
The remains of three vessels were recovered from this site. This includes an example each of the Hm1, Hm8 and Hm10 wares.

Loc. 244 (off grid): 25 km south of Dakhleh
(not mapped)
Although not strictly in the oasis, the material recovered from this site was included in the analysis as it is typical of what can be found in the overall collection. It includes a perforated disc, classified as an Hp3 ware (no illustration available), and the remains of five vessels: one example of the Hp1 ware with a subclass 5 shape (Pl. 27e); three examples of the Hp2 ware, two of which have subclass 1 shapes (Pl. 27f–g); and an example of the Hx1 ware.

Loc. 250 (off grid): no geographic reference available
(not mapped)
The remains of a Fabric 1B vessel were recovered from this site.

Loc. 252 (30/435-N9-1): southeast Dakhleh (Fig. 11)
The remains of six vessels were recovered from this site. This includes one example each of the Hm1, Hp7, Hp10, Hp19 and Hmc2 wares, and an example of the 1B fabric.

Loc. 253 (30/435-M9-1): southeast Dakhleh (Fig. 11)
The remains of two vessels were recovered from this site and are identified as examples of the Hp1 and Hm1 wares.

Loc. 254 (30/450-B10-1): southeast Dakhleh (Fig. 11)
The remains of 10 vessels were recovered from this site. This includes three examples of the Hp1 ware; three examples of the Hm1 ware, two of which have subclass 6 shapes (Pl. 28a–b) and one with a subclass 1 shape (Pl. 28c); and an example each of the Hp3, Hp10 and Hp21 wares and the 5B fabric.

Loc. 257 (30/450-E4-2): southeast Dakhleh (Fig. 11)
The remains of six vessels were recovered from this site. Included are two examples of the Hp20 ware and an example each of the Hp2, Hp6, Hp14 and Hm7 wares.

Loc. 258 (30/450-E5-1): southeast Dakhleh (Fig. 11)
The remains of eight vessels were collected from this site. Included are two examples of the Hp1 and Hm1 wares, and one example each of the Hp20 (Pl. 28d) and Hmx1 wares. Examples of the 1B and 2A fabrics were also collected, the latter of which has a subclass 3 shape (Pl. 28e).

Loc. 259 (30/420-D7-1): central Dakhleh (Fig. 8)
The remains of two vessels were recovered from this site. One of these is an example of the Hm7 ware and the other an example of the 1B fabric.

Loc. 261 (29/450-F4-1): southeast Dakhleh (Fig. 11)
Only one sherd has been collected from this site and is classified as a 3A fabric.

Loc. 269 (29/450-F1-1): southeast Dakhleh (Fig. 11)
Only one sherd has been collected from this site and is classified as an Hm10 ware.

Loc. 270 (30/450-F10-2): southeast Dakhleh (Fig. 11)
Only one sherd has been collected from this site and is an example of the 3F fabric.

Loc. 275 (30/435-P10-1): southeast Dakhleh (Fig. 11)
The remains of one vessel have been recovered from this site, identified as an Hd4 ware (Pl. 2f).

Loc. 276 (30/435-P10-2): southeast Dakhleh (Fig. 11)
Only one sherd was recovered from this site and is an example of the 3A fabric.

Loc. 278 (30/450-F10-3): southeast Dakhleh (Fig. 11)
The single find from this site is an example of the Hm1 ware.

Loc. 302 (off grid): southeast Dakhleh (Fig. 11)
The remains of two vessels have been recovered from this site. One is an example of the Hm7 ware and the other an example of the 1A fabric.

Loc. 304 (30/450-D9-1): southeast Dakhleh (Fig. 11)

The remains of five vessels have been recovered from this site. Included are three examples of the Hm1 ware, and an example each of the Hm2 ware and 4D fabric.

Loc. 306 (30/450-F10-4): southeast Dakhleh (Fig. 11)

The remains of two vessels were recovered from this site, one of which is an Hp1 ware and the other an Hm10 ware.

Loc. 307 (30/450-F10-5): southeast Dakhleh (Fig. 11)

The remains of two vessels were recovered from this site. One of these is an Hm1 ware and the other an Hd4 ware.

Loc. 365 (31/420-E10-4): central Dakhleh (Fig. 18)

The remains of three vessels were recovered from this site. Included are examples of the Hp1 and Hm11 wares and the 1D fabric.

Loc. 380 (31/420-39-1): central Dakhleh (Fig. 18)

The remains of 11 vessels were collected from this site. These include three examples of the Hp2 ware with subclass 1 and 4 shapes (Pl. 28f–g); two examples of the Hp1 ware, one with a subclass 4 shape (Pl. 28h); and single examples of the Hp7, Hc9 and Hp10 wares, the latter with a subclass 1 shape (Pl. 28i). Also in this collection are a few examples of the 1B and 1C fabrics – one of the 1B finds has a subclass 2 shape (Pl. 28j).

Loc. 381 (31/420-E10-6): central Dakhleh (Fig. 18)

The remains of four vessels were recovered from this site. Included are examples of the Hp1 and Hm1 wares, the latter with a subclass 2 shape (Pl. 28k), and examples of the 1A fabric with eroded surface treatment.

Loc. 382 (31/420-E10-7): central Dakhleh (Fig. 18)

The remains of 24 vessels were recovered from this site. Included are four examples of the Hp1 with subclass 1 and 4 shapes (Pl. 28l–n); three examples of the Hp2 and Hp3 wares, the latter with subclass 1 and 4 shapes (Pl. 28o–q); two examples of the Hx2 ware, one with a subclass 1 shape (Pl. 28r); and single examples of the Hp4, Hp24, Hp26, Hx1 and Hm7 wares. There also remain some poorly preserved examples of 1A, 1B, 1C and 9C fabrics – the 1C fabric appears in the form of a scraper (Pl. 29a).

Loc. 385 (30/435-P9-2): southeast Dakhleh (Fig. 11)

The remains of two vessels were recovered from this site; these are examples of the Hp2 and Hc5 wares.

Loc. 388 (31/420-N10-2): central Dakhleh (Fig. 18)

The remains of seven vessels were recovered from this site including three examples of the Hp2 ware, two examples

of the Hp1 ware, and single examples of the Hp6 and Hp21 wares.

Loc. 401 (30/450-F7-6): southeast Dakhleh (Fig. 11)

The remains of four vessels were collected from this site including two examples of the Hp10 ware and an example each of the Hp2 and Hm5 wares.

Loc. 402 (off grid): northeast Dakhleh (Fig. 18)

A truncated cone, a disc, and the remains of 10 vessels were recovered from this site. The cone has been identified as an Hx5 ware (Pl. 29b), while the disc is an example of the Hp2 ware (Pl. 29c). The remainder of the collection includes four examples of the Hp1 ware with shapes from subclasses 1, 2, 3 and 4 (Pl. 29d–g), and single examples of the Hx1 ware with a subclass 4 shape (Pl. 29h), the Hmc4 ware with a subclass 1 shape (Pl. 29i), the Hc1 ware with a subclass 1 shape (Pl. 29j), the Hc8 ware with a subclass 1 shape (Pl. 29k), the Hp8 ware with a subclass 2 shape (Pl. 29l) and the Hp10 ware.

Loc. 404 (33/390-K2-2): northwest Dakhleh (Fig. 18)

The remains of an estimated 178 vessels have been recorded from this site, some of which come from sub-surface contexts. Excavation took place across an area of 23 m² and the sub-surface levels comprising material culture were no deeper than 60 cm. It is uncertain that these represent temporally separate stages of site development for several reasons: the site is partially deflated, it is also in an area of modern cultivation and subject to constant disturbance, excavated material comes from two pits that are not clearly stratified, and in a number of instances sherds belonging to one vessel were found in different layers and on the surface. Nonetheless, an attempt was made to group the pottery according to its position on site. The surface finds are dealt with first and following this are the finds from sub-surface deposits in two areas of the site: squares M/N/O/P/Q30–31 and R/S29–30.

Much of the surface material is poorly preserved and several finds could only be identified for fabric – the list includes the 1A, 1B, 1C, 1D, 4E, 8A and 9A fabrics. One of the Fabric 9A finds has a subclass 7 shape (Pl. 30a). As for the finds that preserve surface treatment, plain wares dominate the collection. This includes 71 examples of the Hp1 ware with shapes from subclass 1 (Pls 30b–g, j–t and v–w; 31a–d and f–i), subclass 2 (Pl. 31j–k), subclass 4 (Pls 31l–p; 32a–c and e–j) and subclass 6 (Pl. 32k). The Hp2 ware is represented in the surface collection by 22 examples with shapes from subclass 1 (Pl. 32l–n, p–r and t–u) and subclass 4 (Pl. 33b–g).

Other plain wares recovered from surface contexts include four examples of the Hp3 ware with shapes from subclasses 1 and 4 (Pl. 33h–k); an example each of the Hp4 and Hp5 wares, the former with a subclass 1 shape (Pl. 33l); three examples of the Hp8 ware; five examples

of the Hp10 ware with shapes from subclasses 1 and 4 (Pl. 33m–o); and two examples each of the Hp26, Hp27 and Hp28 wares. The remainder of the surface collection includes examples of the Hx1 the Hx2 wares, the latter with shapes from subclasses 1 and 4 (Pl. 33p–q), and examples of the Hm1, Hc3, Hc4 and Hc11 wares, the latter with a subclass 1 shape (Pl. 34a).

As for the excavated finds, the remains of a few vessels were recovered from sub-surface 'L1' contexts in a large pit covering squares M30, N30 and N31. To be clear, some sherds found in this layer were identified with surface finds and are recorded accordingly. The remainder includes examples of the Hp1 ware with a subclass 4 shape (Pl. 31q), the Hp24 ware and the 1A, 1B and 7B fabrics – an example of the Fabric 1B appears in the form of a scraper (Pl. 34b). The remains of 41 vessels were recovered from sub-surface contexts in squares R29–30 and S29–30. A large hearth forms part of the sub-surface contexts and three layers of soil were identified. The same problem exists that sherds from the one vessel cut across these layers and into the hearth and some were also found on the surface.

The finds associated with the hearth context 'H1' include six examples of the Hp1 ware with shapes from subclasses 1 and 4 (Pls 30i and 31r), examples of the Hp7 ware with a subclass 1 shape (Pl. 34c) and the Hc10 ware. A few examples of the 1A fabric without surface treatment were also recovered from this context. Finds associated with hearth context 'H2' include examples of the Hp1 ware with shapes from subclasses 1, 2 and 4 (Pls 30u; 31e and k; 32d); the Hp2 ware with shapes from subclasses 1 and 2 (Pl. 32o and s; 33a); the Hx1 ware with subclass 1 and 4 shapes (Pl. 34d–e); and single examples of the Hp6 and Hp8 wares, the latter with a subclass 4 shape (Pl. 34f), and the Hp10 and Hp22 wares, the latter with a subclass 4 shape (Pl. 34g). Some examples of the 1A and 1D fabrics without surface treatment were also recovered. Examples of the Hp1 and Hp2 ware were also recovered from below the H2 context.

From context 'L1', the area immediately surrounding the hearth, several examples of the Hp1 ware were recovered with shapes from subclasses 1 and 4 (Pls 30h and 31s), along with an example of the Hp2 ware, and a number of Fabric 1A finds. Some examples of the 1A and 3A fabrics were also recovered from the underlying 'L2' context.

Loc. 405 (30/435-P9-3): southeast Dakhleh (Fig. 8)

The remains of two vessels were recorded from this site. One is identified as an Hm7 ware and judging from the convexity of the body sherds, the vessel was probably deep and open – most likely a subclass 1 shape. Also represented in this collection is an example of the Hm3 ware.

Loc. 406 (31/405-P10-1): central Dakhleh (Fig. 18)

A perforated disc and the remains of 22 vessels were recovered from this site. Included are six examples of the Hp1 ware – one of which is the disc (Pl. 34h) – with shapes from subclasses 1, 4 and 5 (Pl. 34i–m); eight examples of the Hp2 ware with shapes from subclasses 1, 2, 4 or 5 (Pls 34n–o and 35a–f); three examples of the Hp3 ware, one with a subclass 1 shape (Pl. 35g), and the other two with subclass 4 shapes (Pl. 35h–i); two examples of the Hx1 ware, one with a subclass 4 shape (Pl. 35j); two examples of the Hx2 ware with subclass 1 (no illustration available) and subclass 4 shapes (Pl. 35k); and one example each of the Hx3 ware with a subclass 1 shape (Pl. 36a) and the Hc2 ware with a subclass 1 shape (Pl. 36b).

Loc. 407 (off grid): northwest Dakhleh (Fig. 11)

The remains of six vessels were collected from this site. Included are single examples of the Hm1, Hp2 and Hp6 wares and the 1A, 1B and 5B fabrics.

Loc. 409 (grid reference unknown): central Dakhleh (Fig. 11)

A truncated cone, perforated disc and the remains of six vessels were recovered from this site. Included are four examples of the Hp2 ware, one of which is the cone (Pl. 36c) and another the disc (Pl. 36d), and a vessel with a subclass 5 shape (Pl. 36e). Also in the collection are two examples of the Hp4 ware, one with a subclass 4 shape (Pl. 36f) and examples of the Hm1 and Hp18 wares.

Loc. 420 (grid reference unknown): central Dakhleh (Fig. 11)

The remains of six vessels were recovered from this site. The list includes two examples of the Hp2 ware, and one example each of the Hp10 ware and the 1D, 3B and 5B fabrics.

Loc. 422 (off grid): southeast Dakhleh (Fig. 11)

The remains of two vessels were recovered from this site, both of which are identified as the Hp1 ware.

Loc. 423 (off grid): northwest Dakhleh (Fig. 11)

The remains of four vessels were recovered from this site. Included are two examples of the Hp1 ware, one with a subclass 6 shape (Pl. 36g), and an example each of the Hm1 and Hp2 wares.

Findspot 1 (30/450-C3): southeast Dakhleh (not mapped)

The four sherds collected from this findspot all belong to the one vessel, an Hd5 ware (Pl. 2e).

Findspot 4 (30/405-M1-1/3): central Dakhleh
(not mapped)

The single sherd from this findspot is classified as an Hx1 ware with a subclass 1 shape (Pl. 36h).

Findspot 5 (south of Loc. 002): northwest
Dakhleh (not mapped)

A perforated disc in the 1A fabric was recovered from this findspot (Pl. 36i).

Findspot 8 (31/405-M10-1): central Dakhleh
(not mapped)

The single sherd from this findspot is an example of the Hx2 ware with a subclass 1 shape (Pl. 36j).

Findspot 9 (30/420-E1-6): central Dakhleh
(not mapped)

The single sherd from this findspot is an example of the Hx2 ware.

Notes

- 1 Two systems are used for indexing Pleistocene and Holocene prehistoric sites in Dakhleh. The first involves plotting the site on one of thirteen maps that cover various

areas of the oasis and its immediate surroundings. The maps derive from the 'Egypt 1:25,000' series published in 1932 and for purposes of consistency use the same numbering system that was applied nationally (Mills 1979, 168; Churcher 1999a, 267). Each map covers an area 15 km E–W and 10 km N–S and is given two numbers that correspond to its relational position in the series: the zero point was set at Gebel Uweinat in the southwest corner of the country. The maps covering the oasis range from 33/390 in the far northwest corner to 30/450 in the southeast corner. A grid with 1 km intervals was superimposed onto each map and each square given an alpha-numeric denomination according to its E–W position (lettered A to P, 'O' is omitted), and N–S (numbered from 1–10). If more than one site exists in the 1 km², then each site is given an additional digit in order of their finding (Mills 1979, 168). Thus a site can read 30/450-F10-2.

The alternative system of indexing sites, which is used for the current study, is far more straightforward. It simply involves numbering each site sequentially from '000' in order of discovery (Churcher and Mills 1999, 251). Using this system, site '30/450-F10-2' is relabelled Loc. 270: the terms 'locality' (Loc.) and 'site' refer to the same thing and are used interchangeably throughout the study.

- 2 This piece is incorrectly identified elsewhere as coming from Loc. 069 (Hope 2002, 51).

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Plate 1



a) plain surface treatment



b) coated surface treatment



c) compacted surface treatment



d) textured surface treatment

Plate 2



a) rim-top decoration



b) rippling decoration



c) complex decoration



d) imitation-basketry decoration



e) impressed decoration



f) impressed decoration



g) fingernail decoration



h) potmark

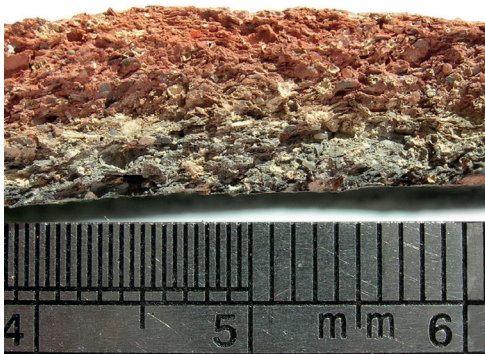
Plate 3



a) section of a Fabric 1A sample



b) section of a Fabric 1B sample



c) section of a Fabric 1C sample



d) section of a Fabric 1D sample

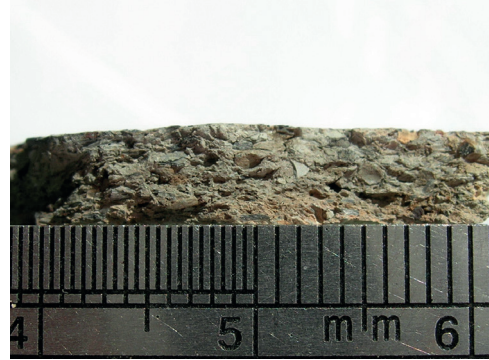


e) section of a Fabric 1E sample

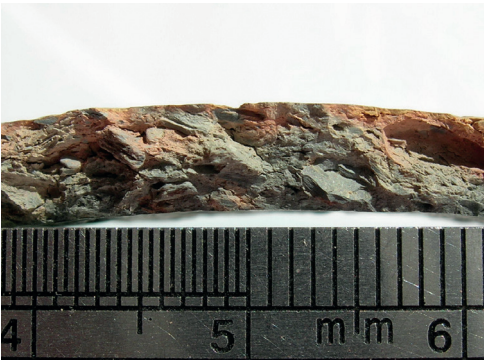
Plate 4



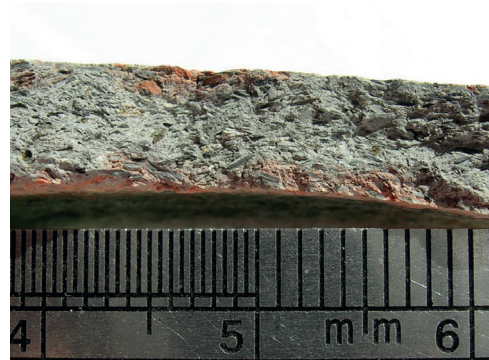
a) section of a Fabric 2A sample



b) section of a Fabric 2B sample



c) section of a Fabric 2C sample

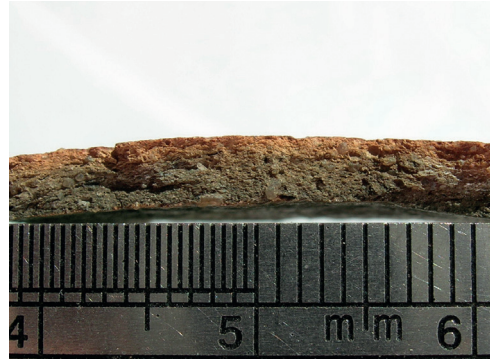


d) section of a Fabric 2D sample

Plate 5



a) section of a Fabric 3A sample



b) section of a Fabric 3B sample



c) section of a Fabric 3C sample



d) section of a Fabric 3D sample



e) section of a Fabric 3E sample



f) section of a Fabric 3F sample

Plate 6



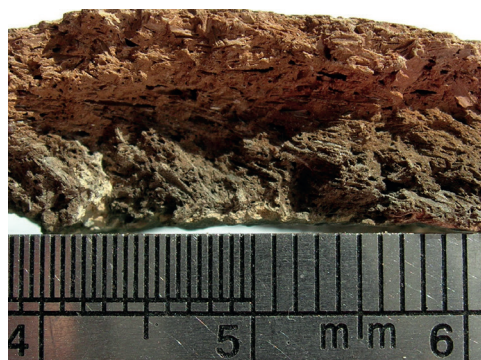
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b) section of a Fabric 4B sample



c) section of a Fabric 4C sample



d) section of a Fabric 4D sample



e) section of a Fabric 4E sample

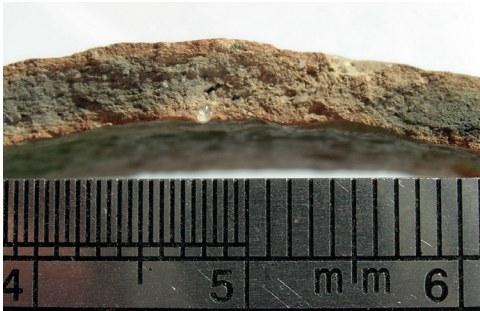


f) section of a Fabric 4F sample



g) section of a Fabric 4G sample

Plate 7



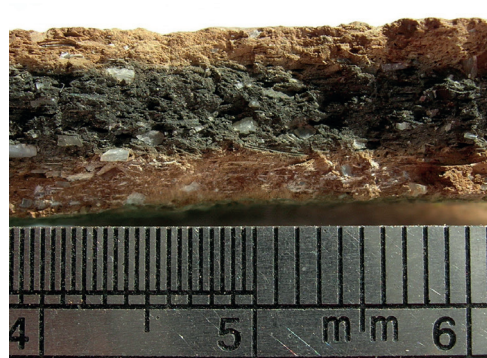
a) section of a Fabric 5A sample



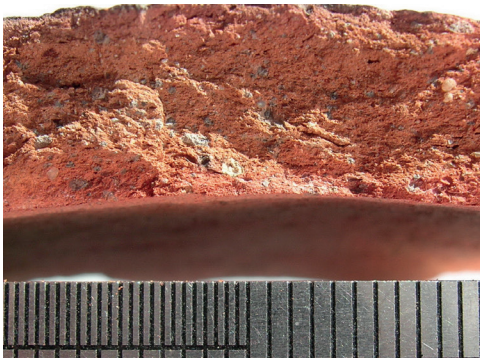
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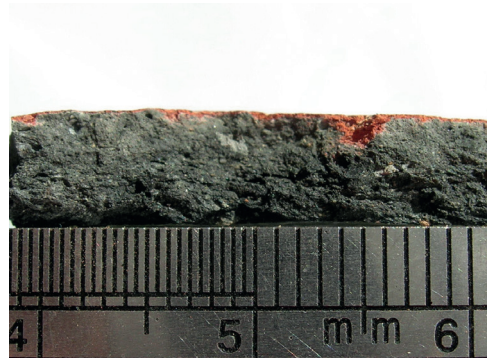
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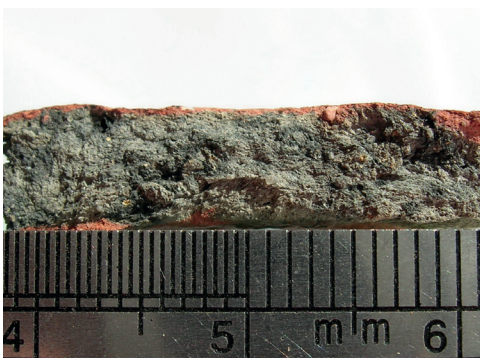
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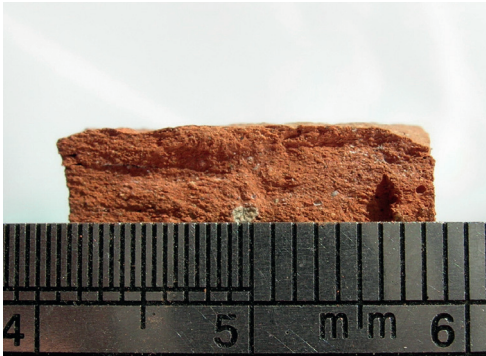


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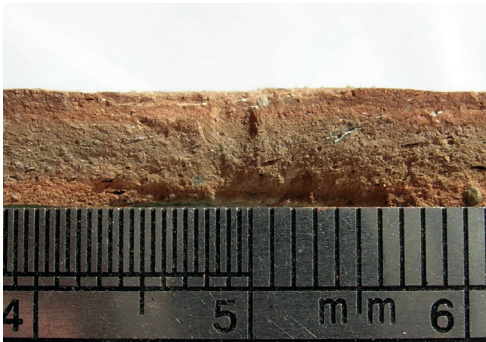


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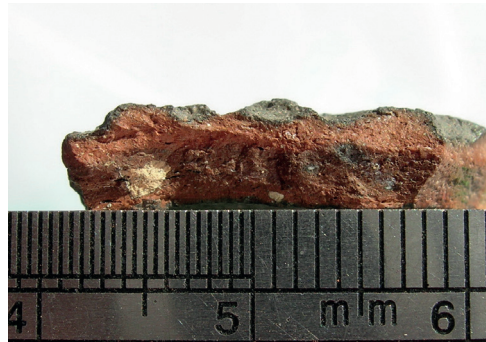
Plate 8



a) section of a Fabric 8A sample



b) section of a Fabric 9A sample

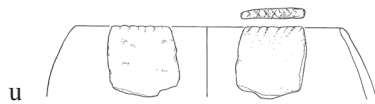
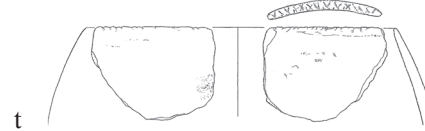
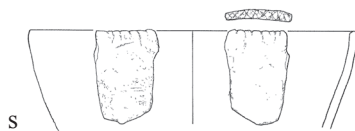
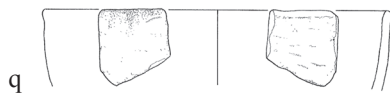
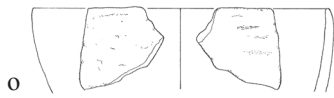
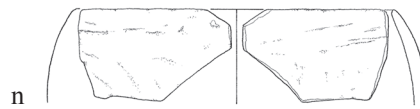
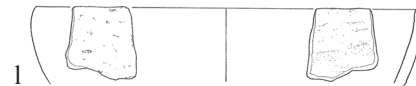
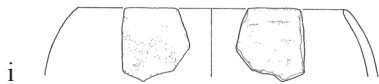
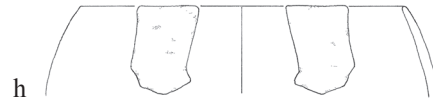
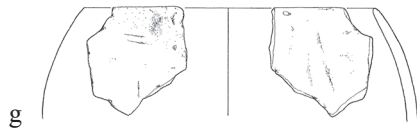
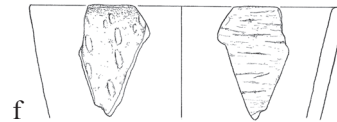
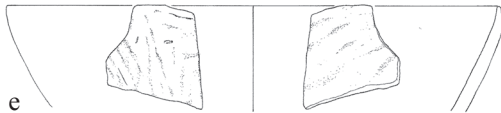
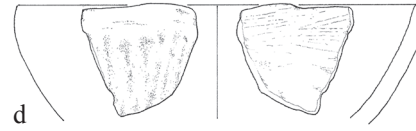
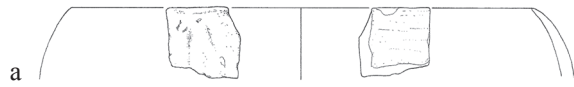


c) section of a Fabric 9B sample



d) section of a Fabric 9C sample

Plate 9



Scale 1:4

Plate 10

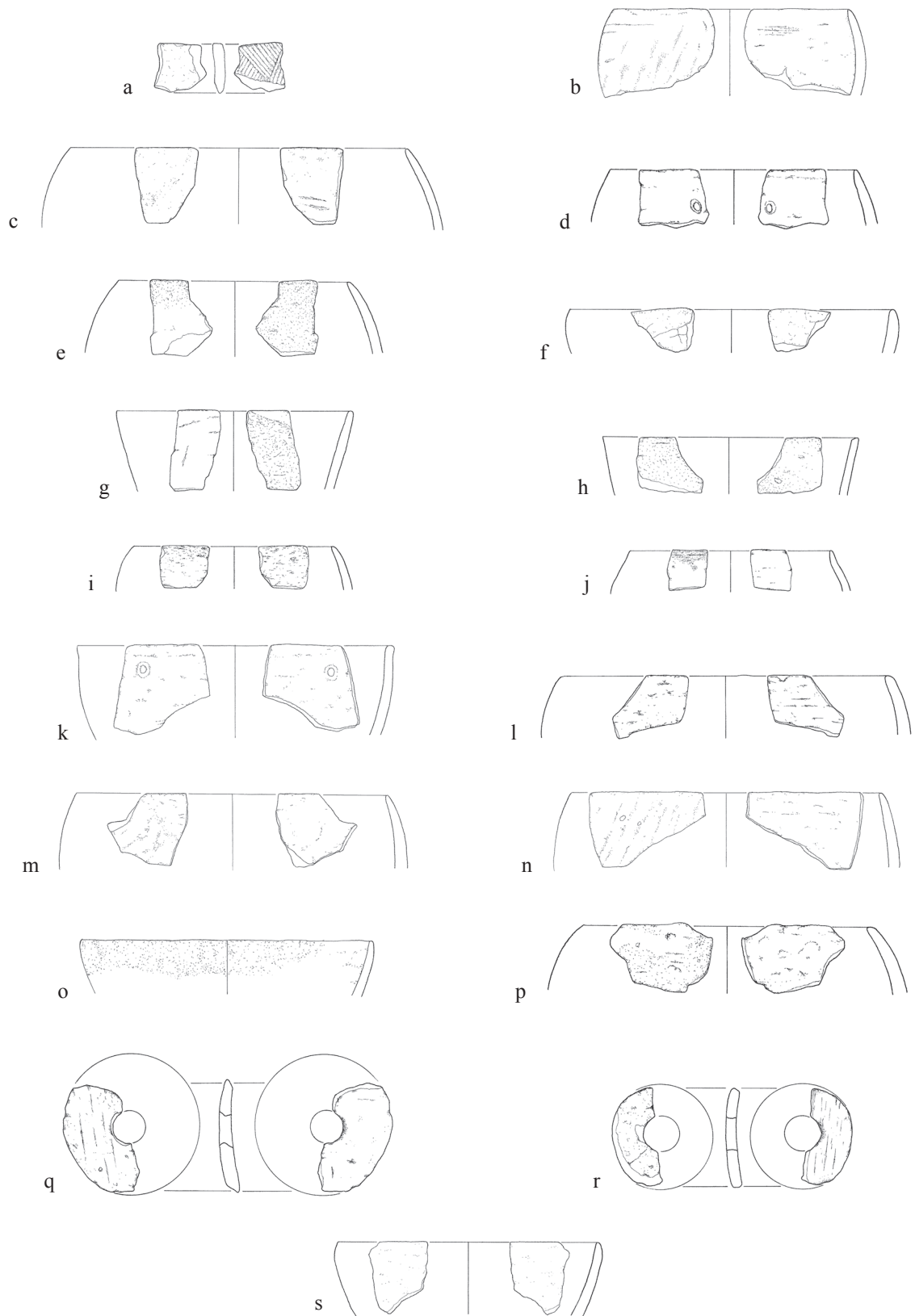


Plate 11

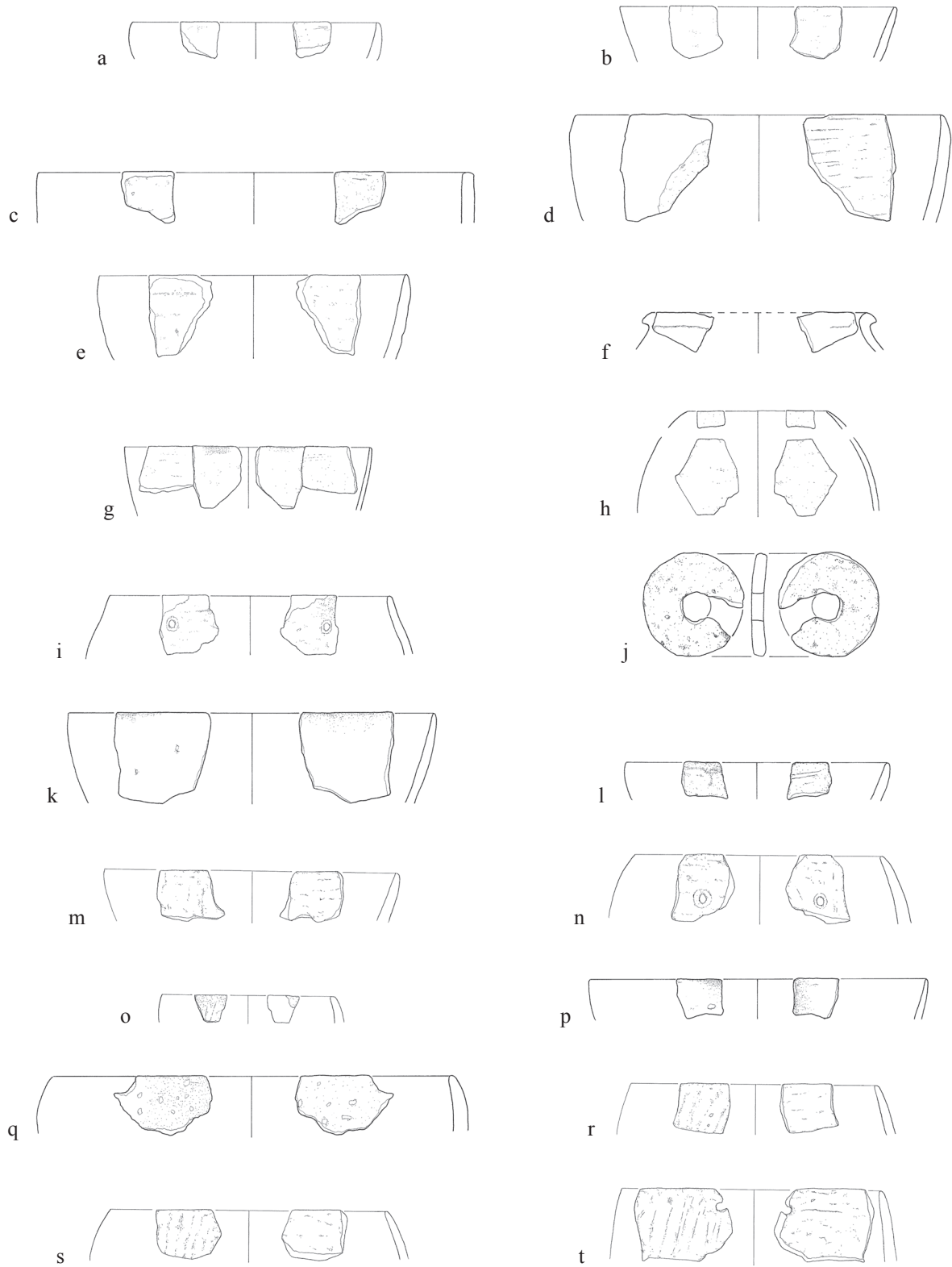


Plate 12

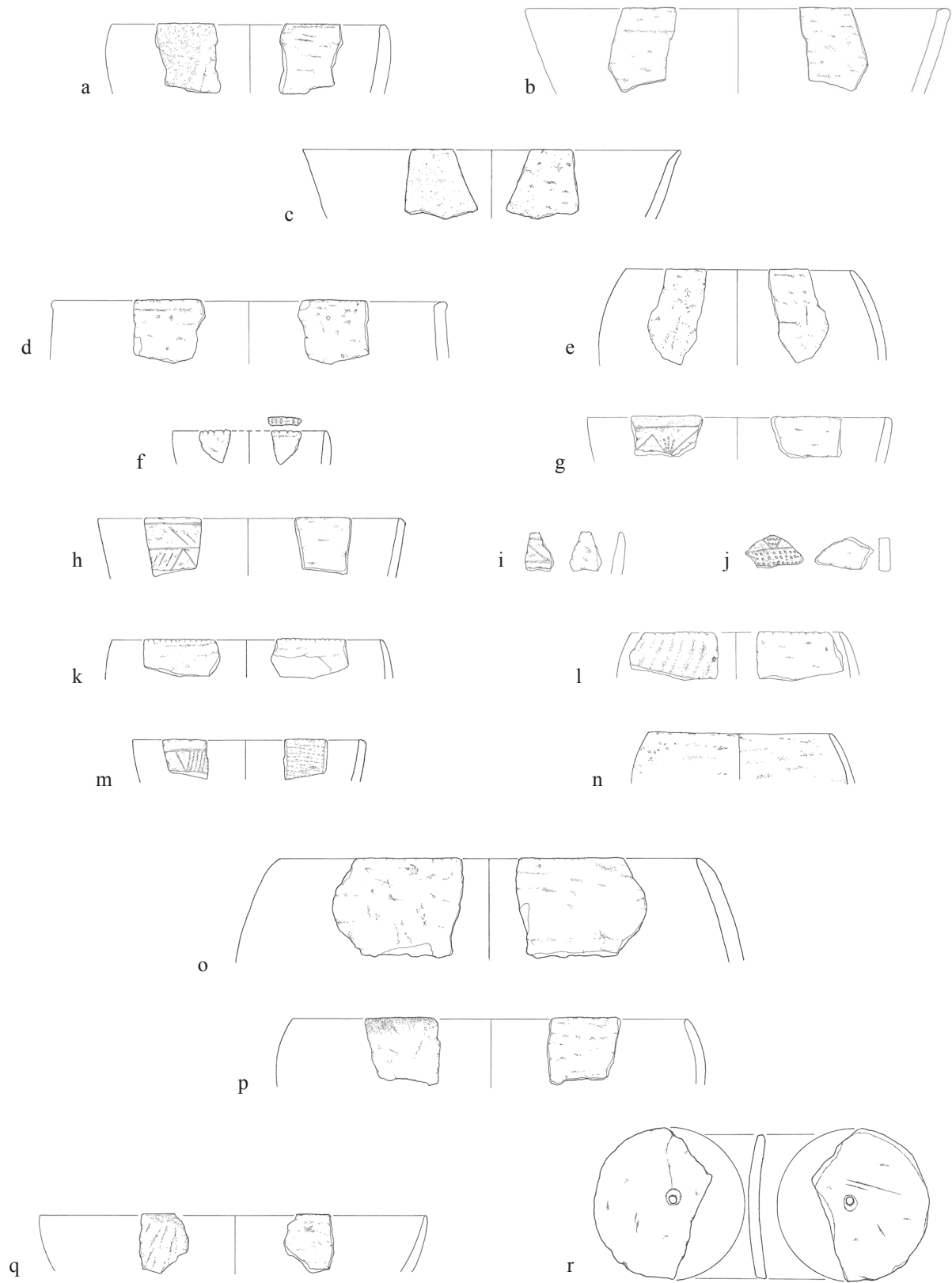


Plate 13

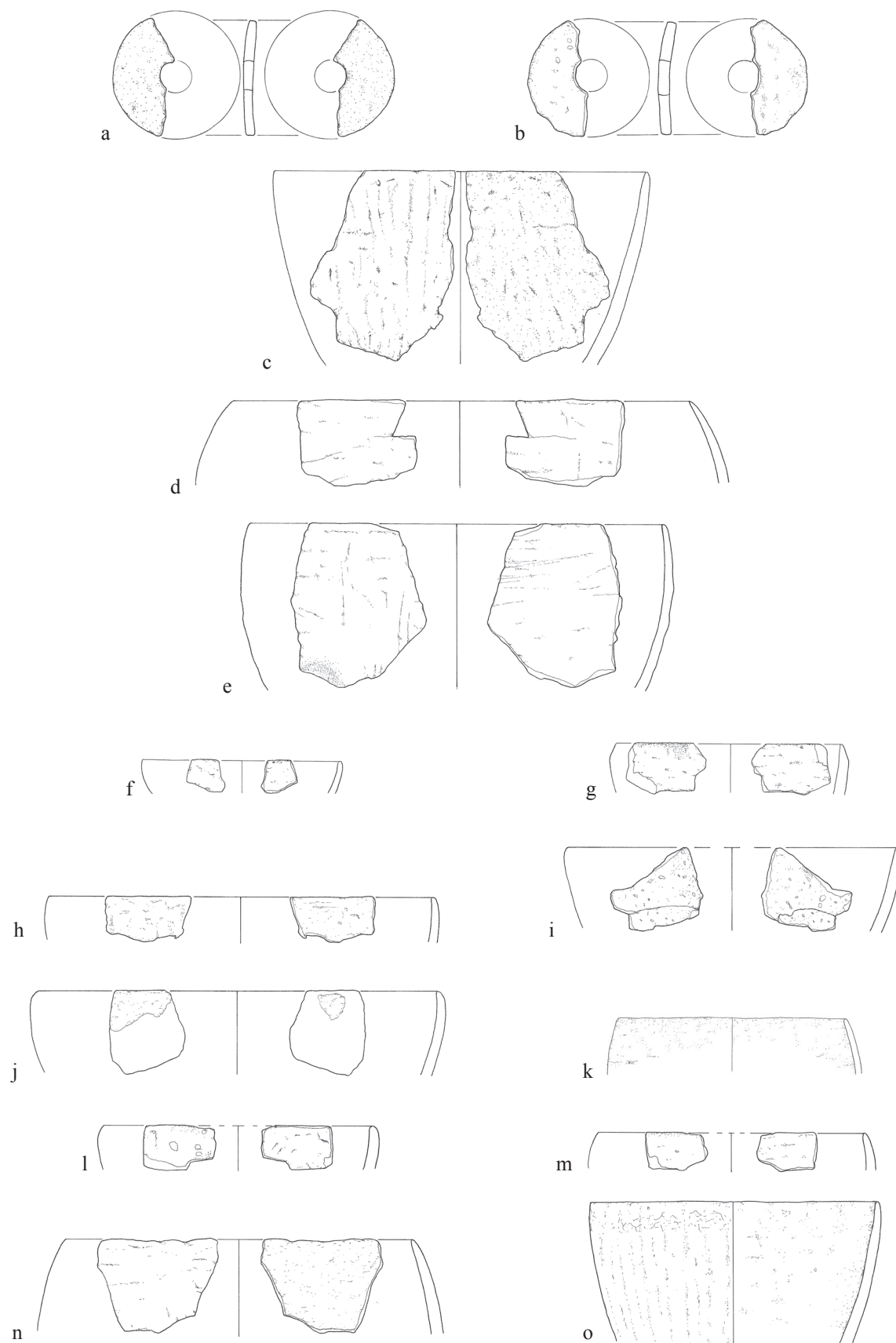


Plate 14

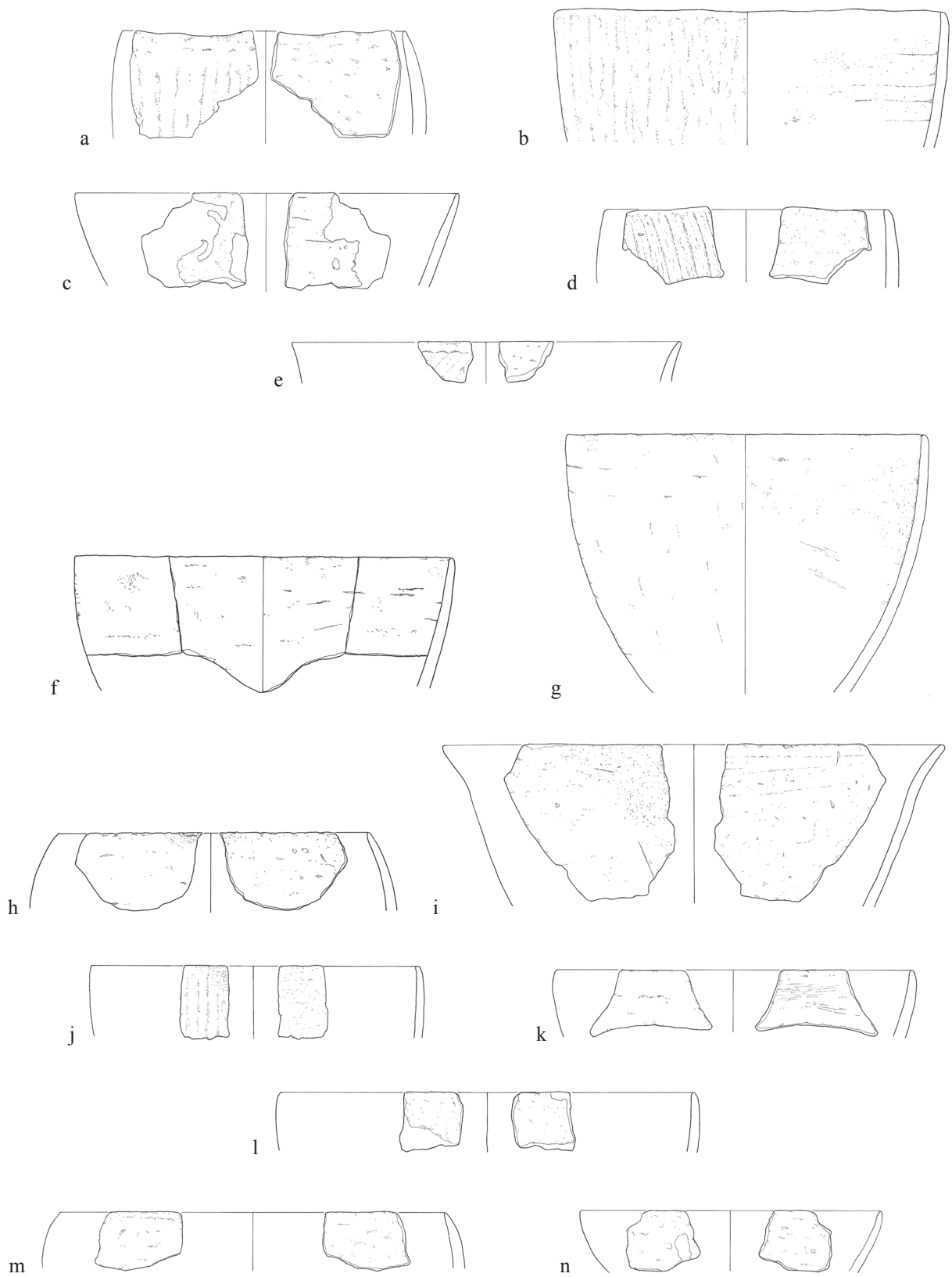


Plate 15

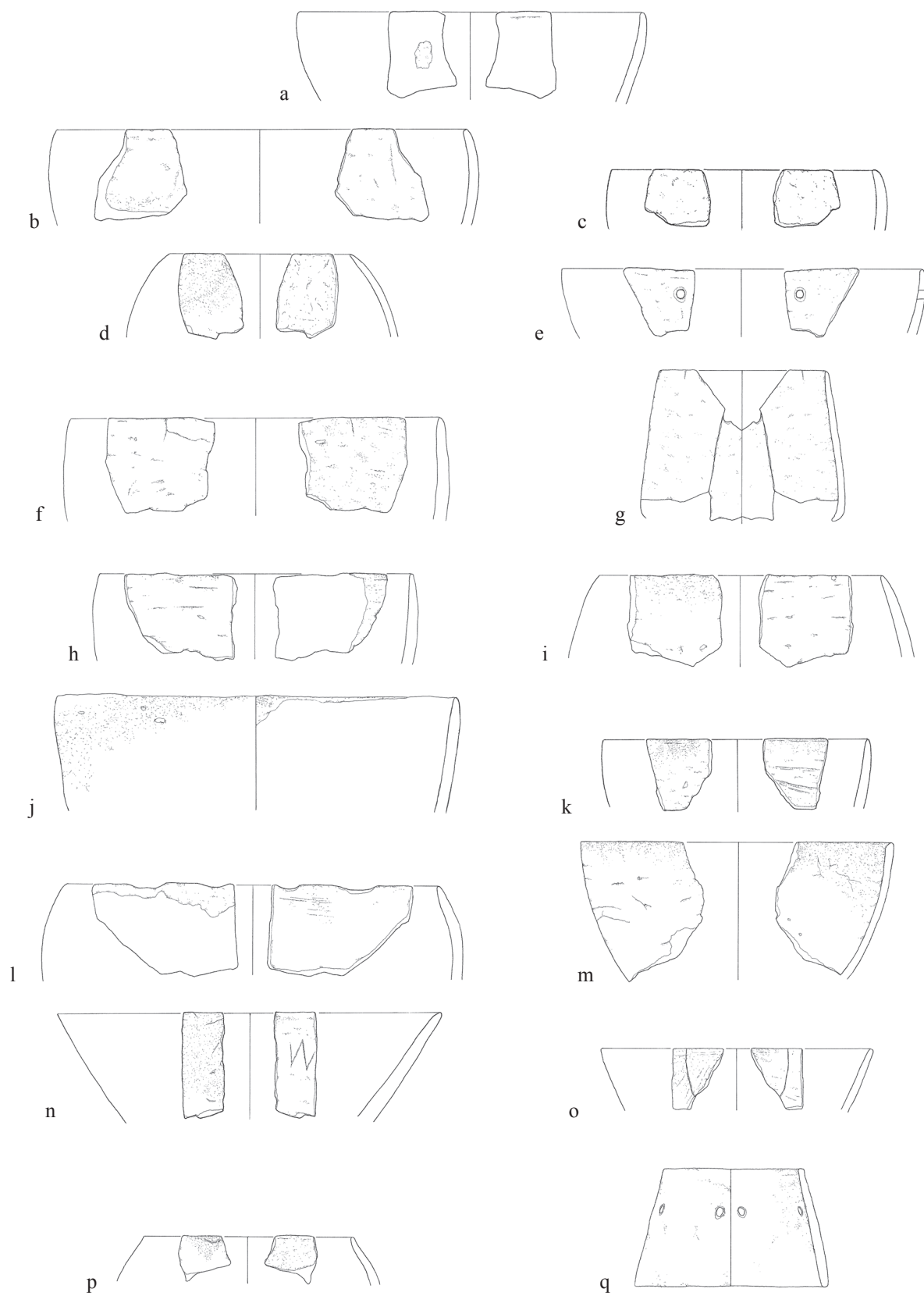


Plate 16

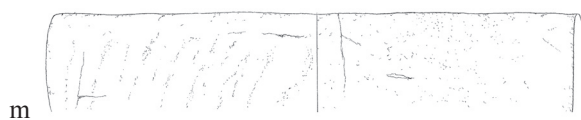
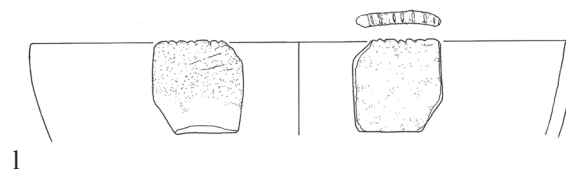
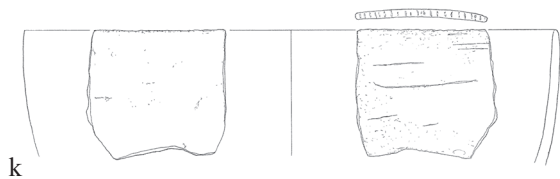
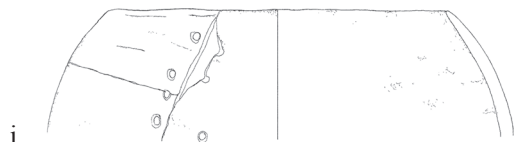
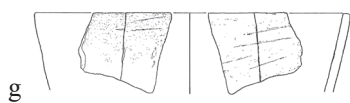
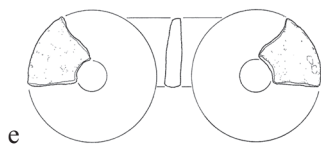
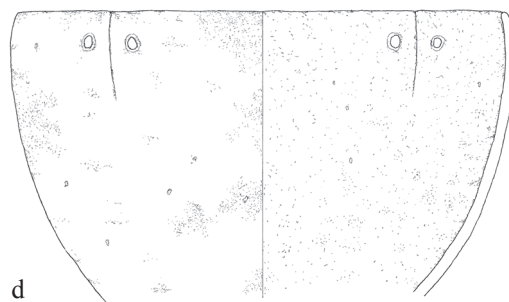
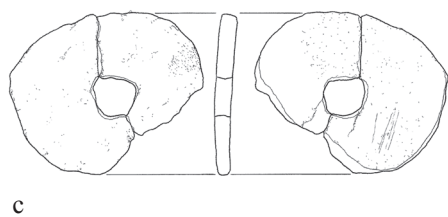
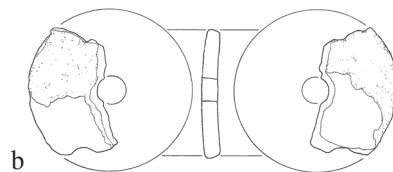
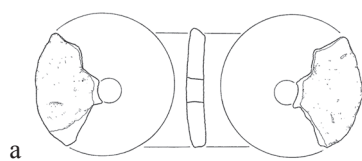


Plate 17

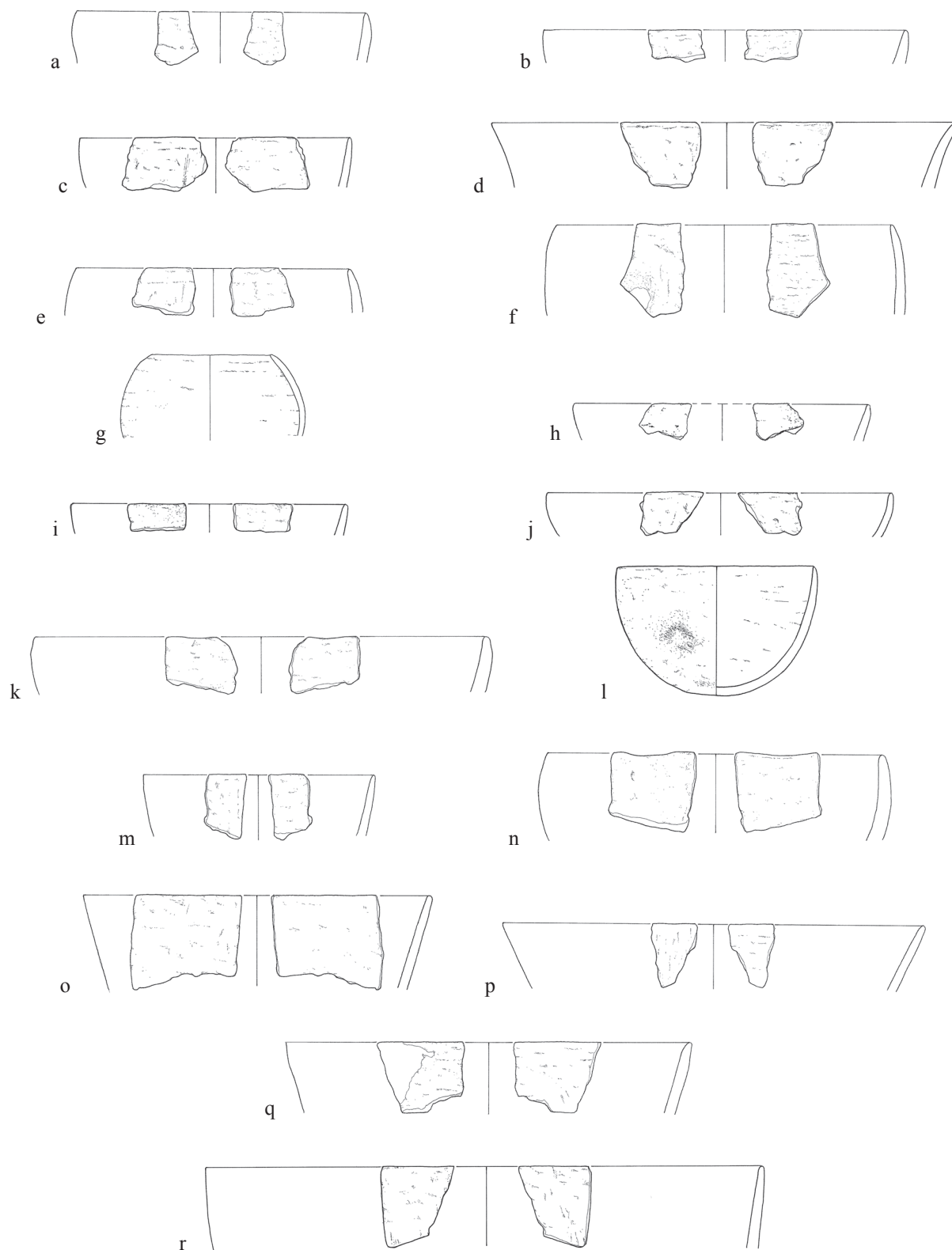


Plate 18

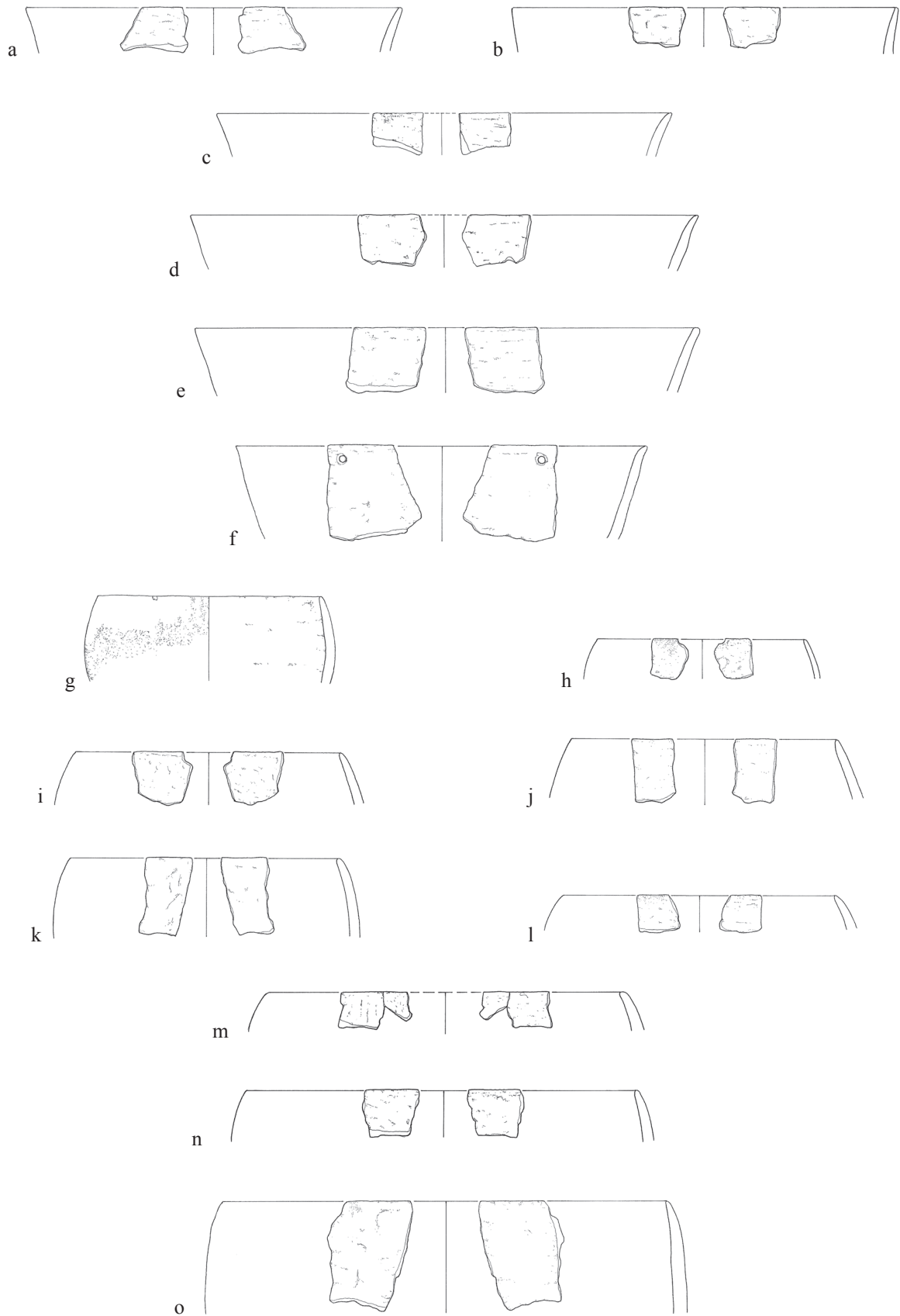


Plate 19

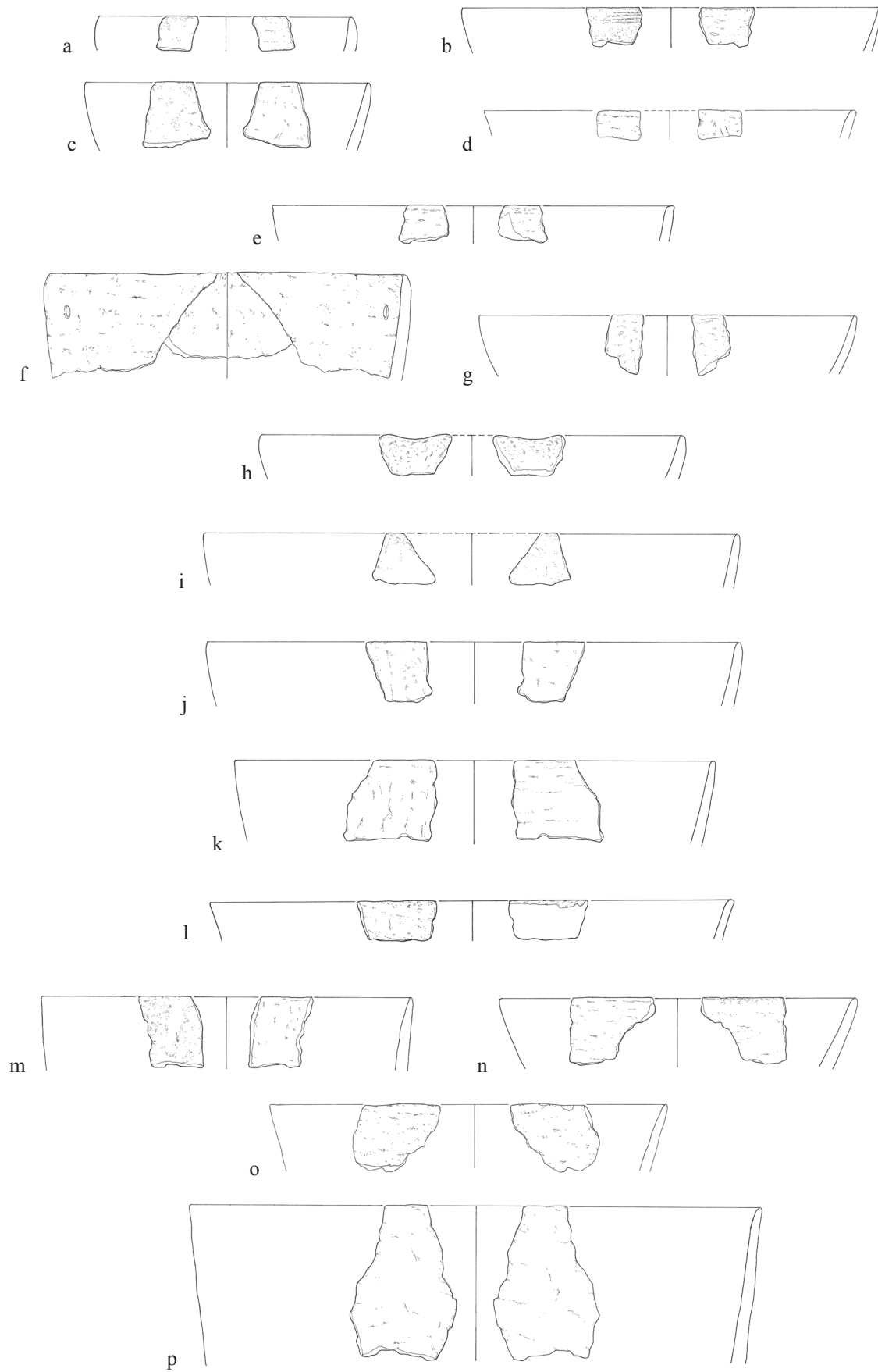
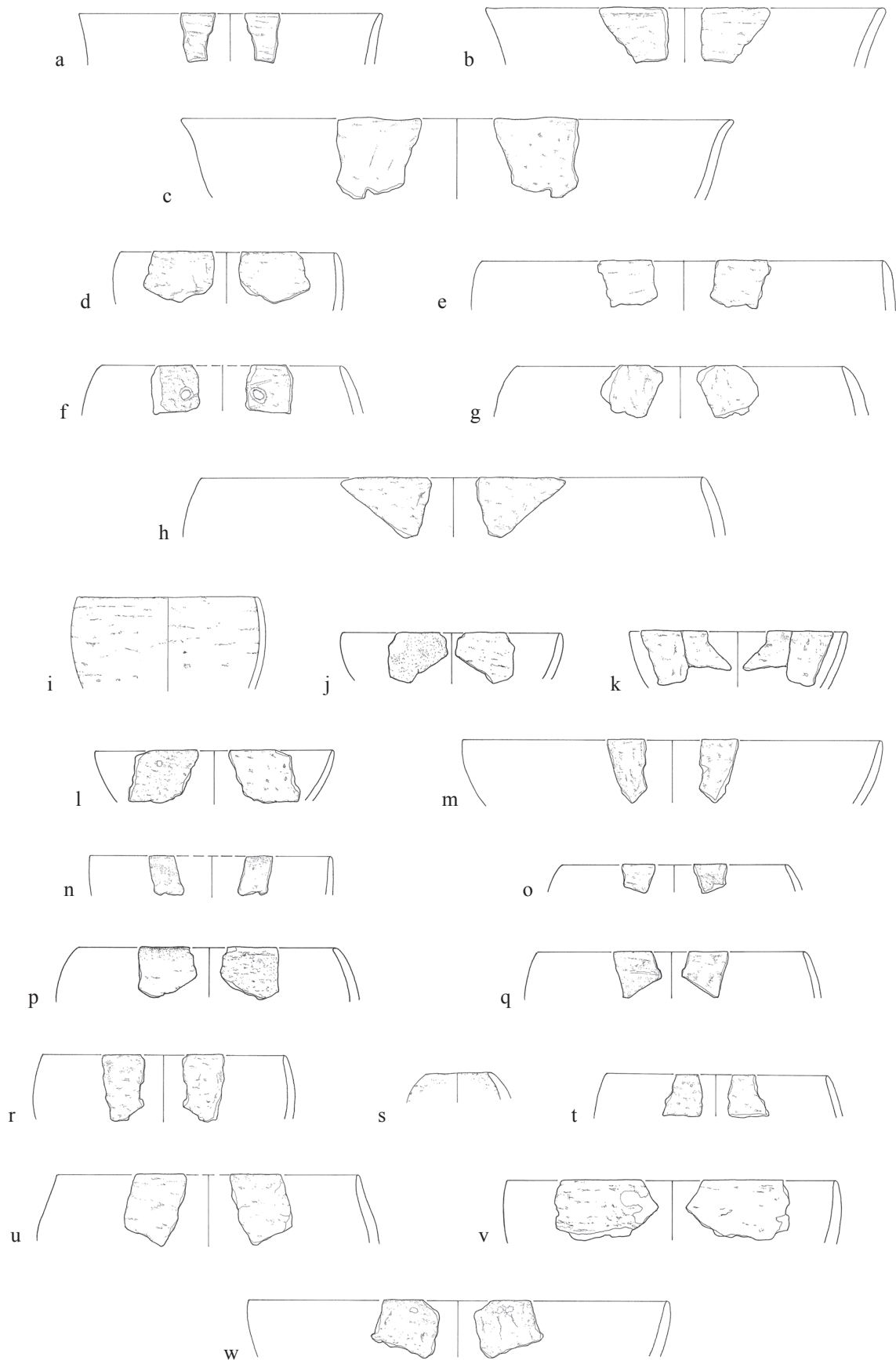


Plate 20



Scale 1:4

Plate 21

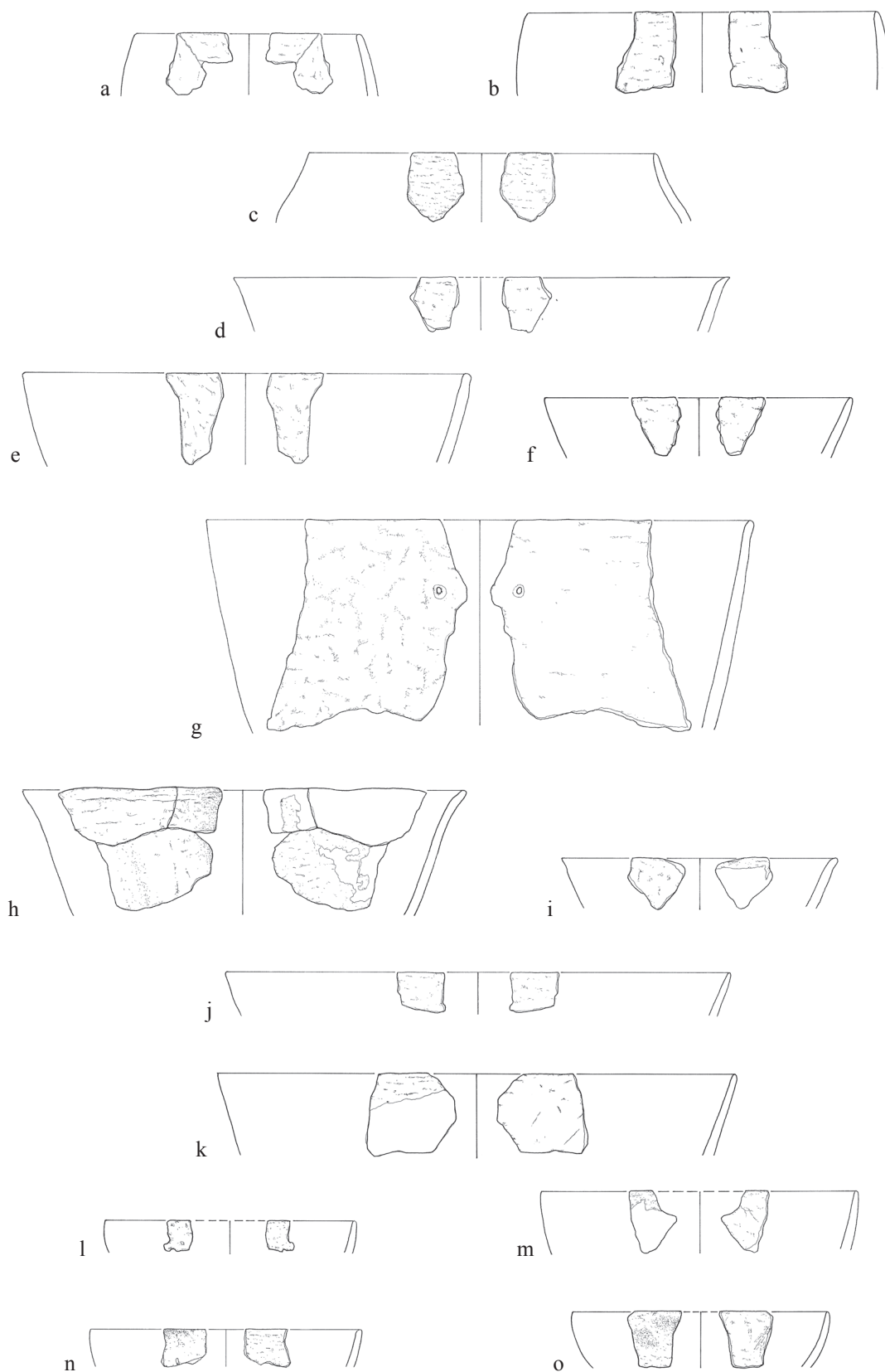


Plate 22

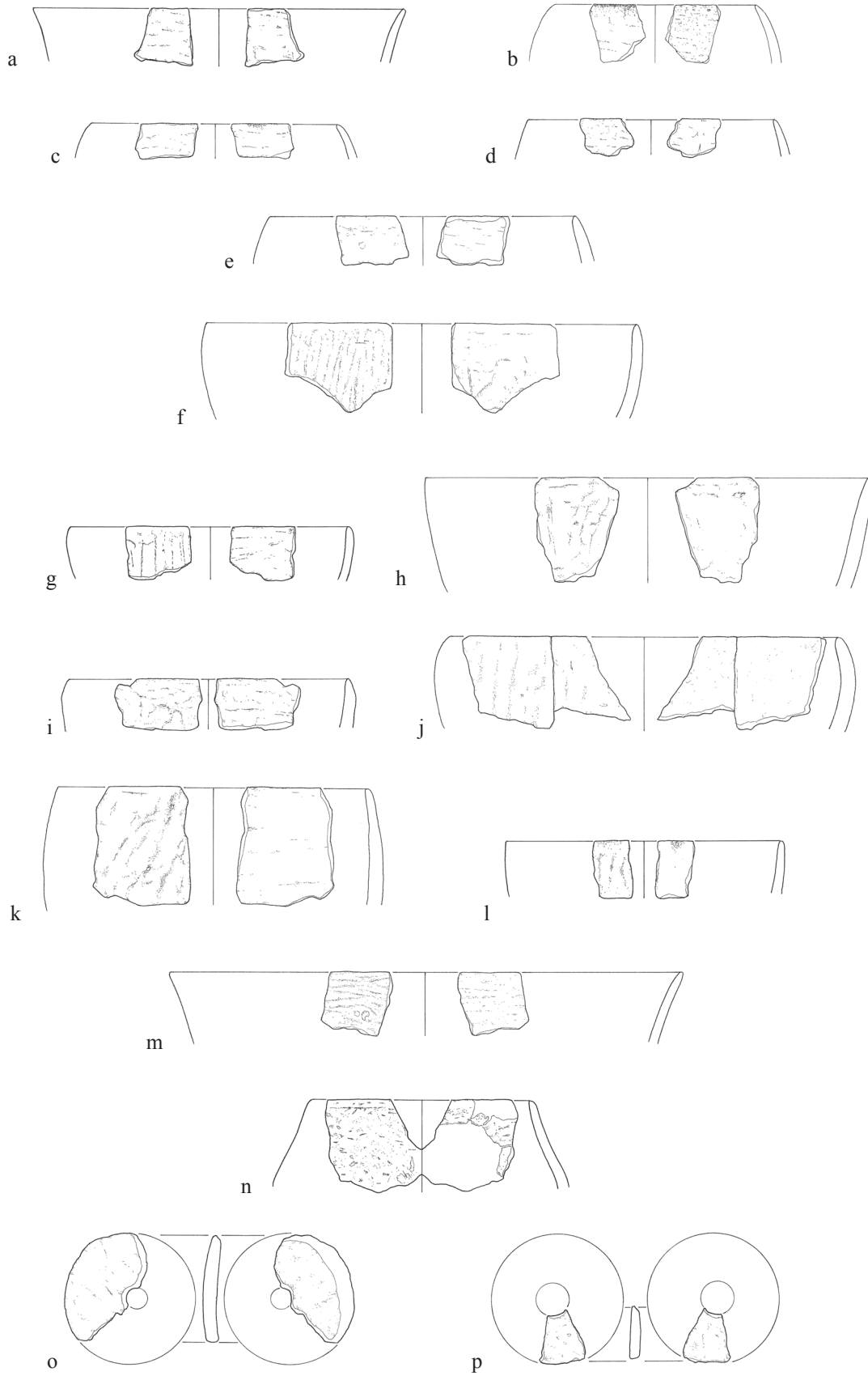
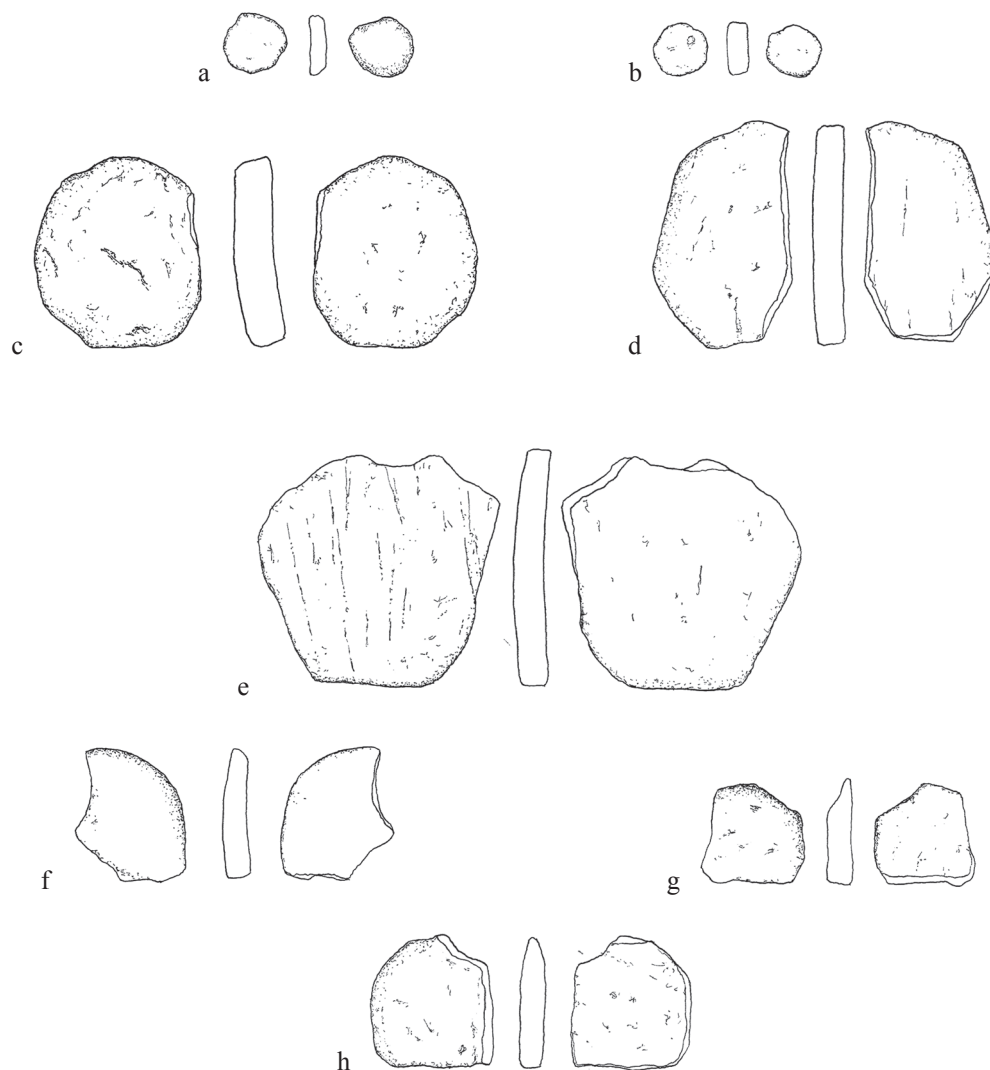


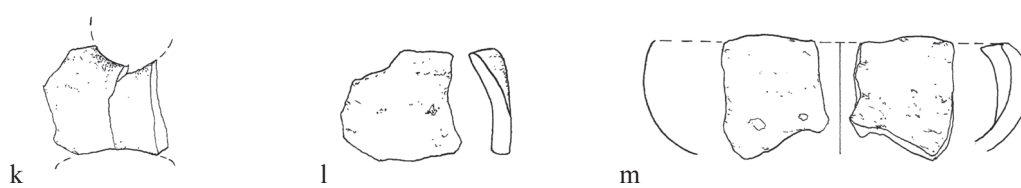
Plate 23



Scale 1:2



Scale 1:4



Scale 1:2

Plate 24

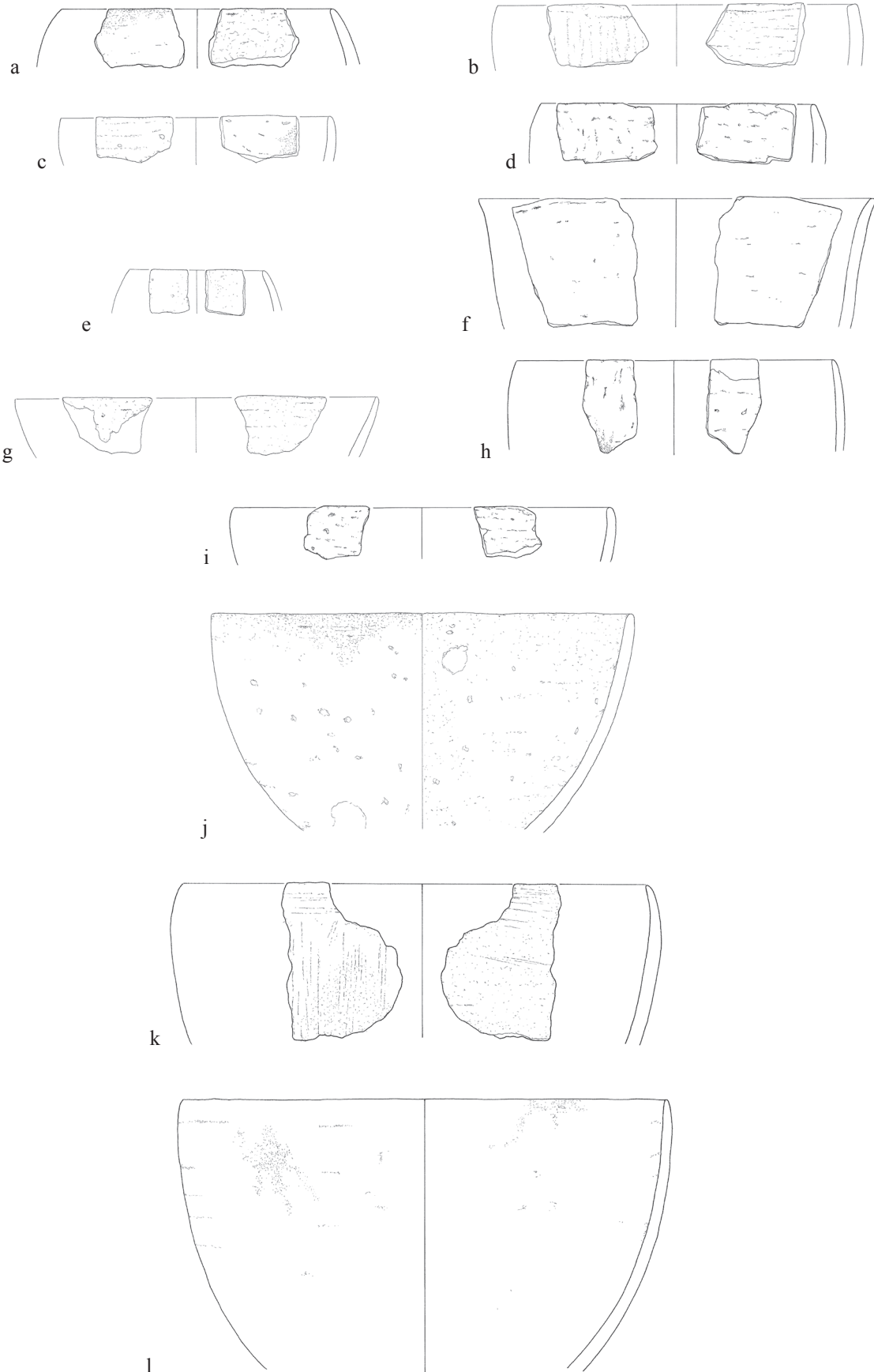


Plate 25

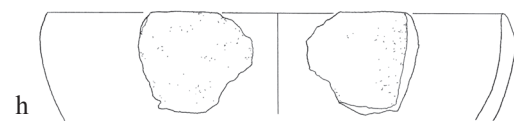
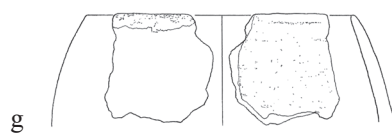
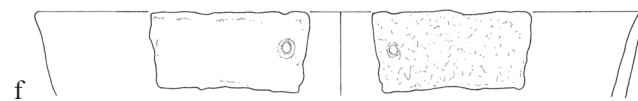
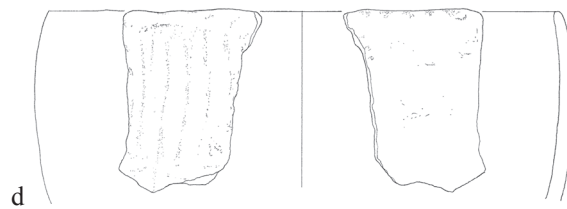
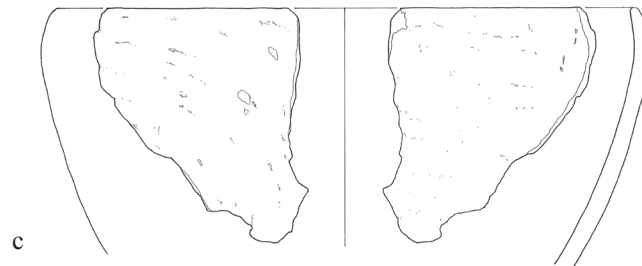
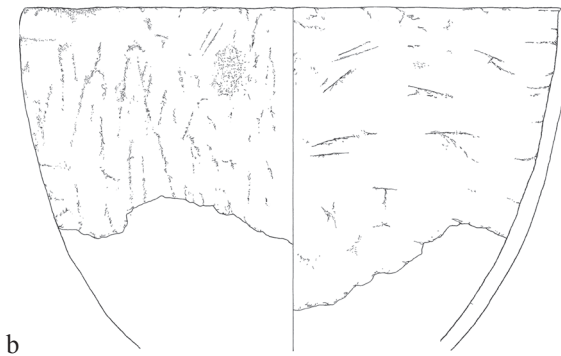
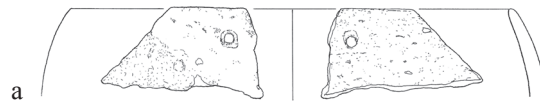


Plate 26

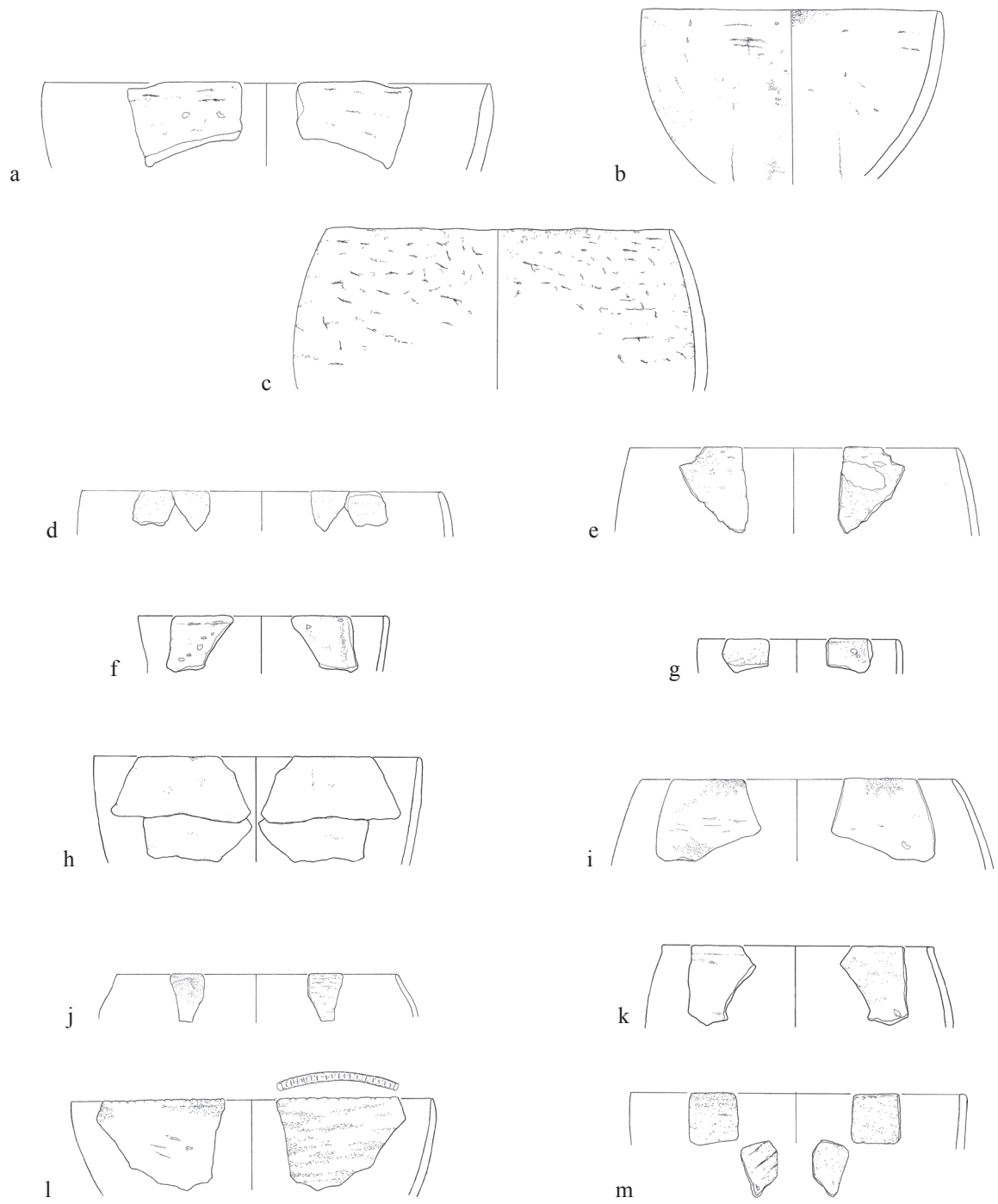
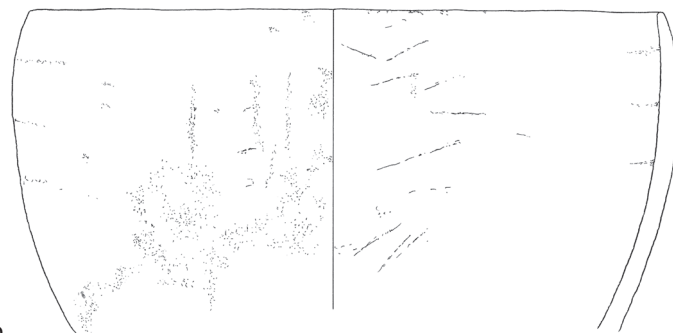


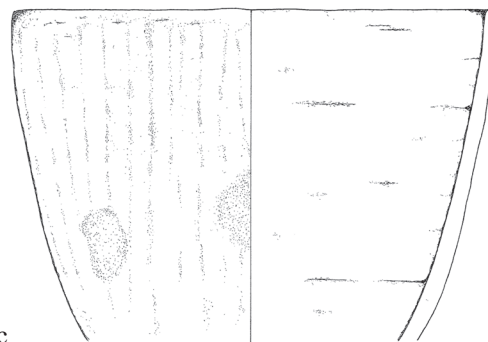
Plate 27



a



b



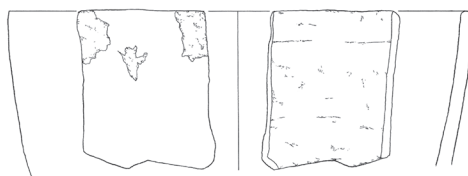
c



d



e



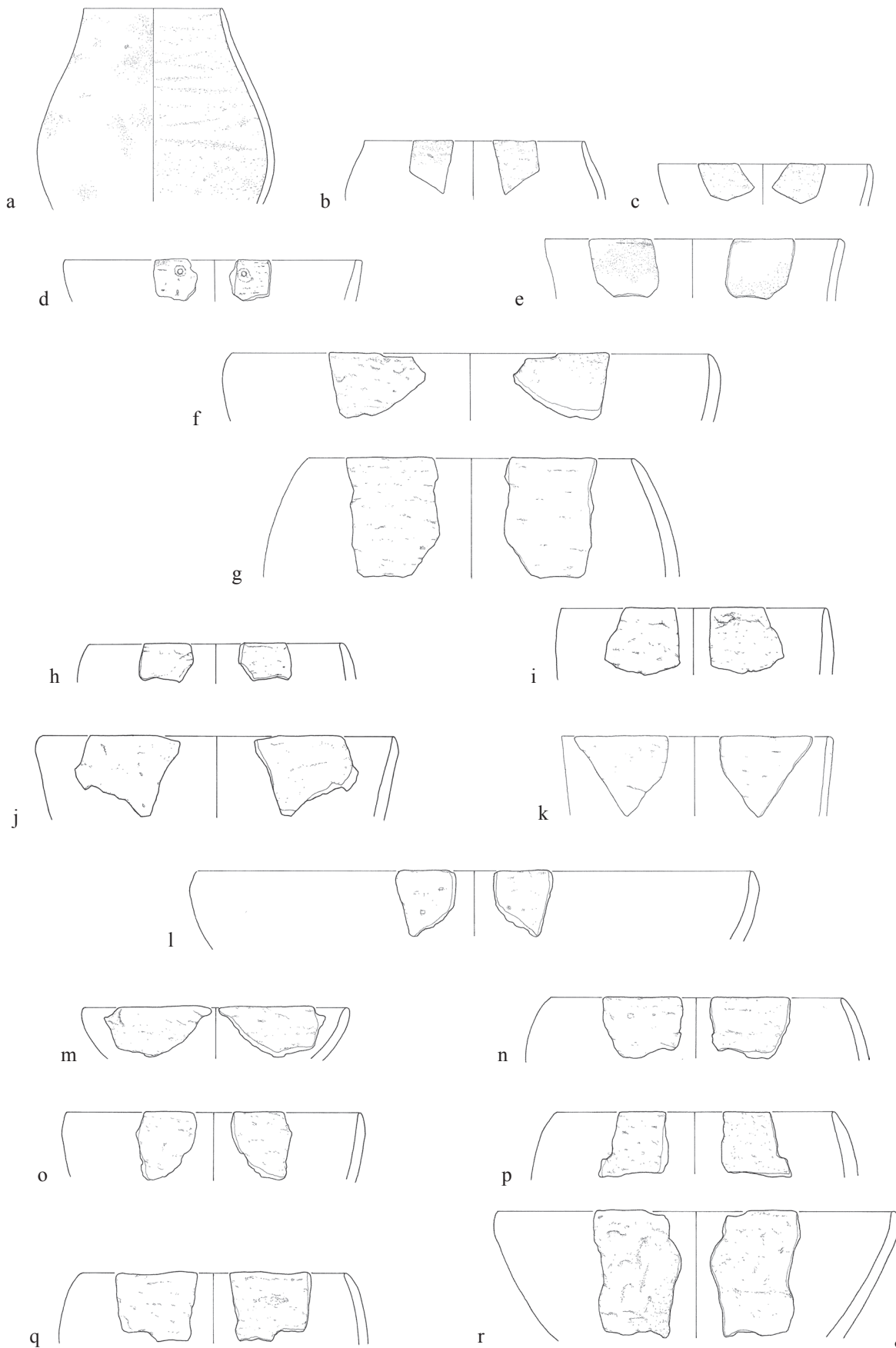
f



g

Scale 1:4

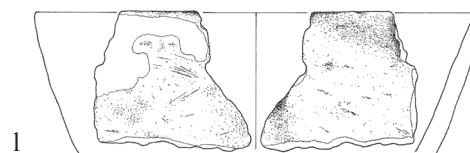
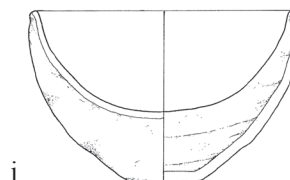
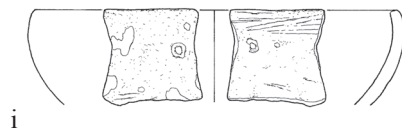
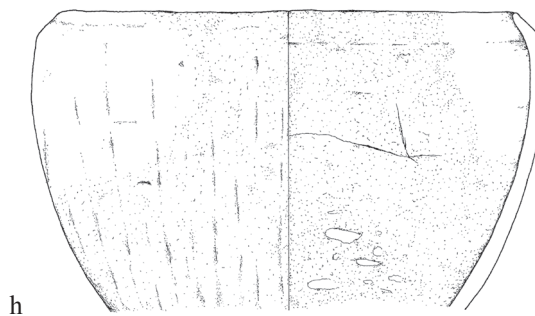
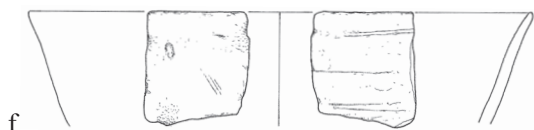
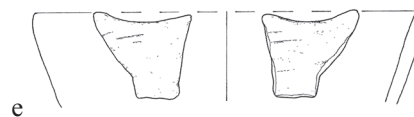
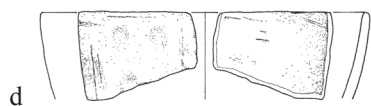
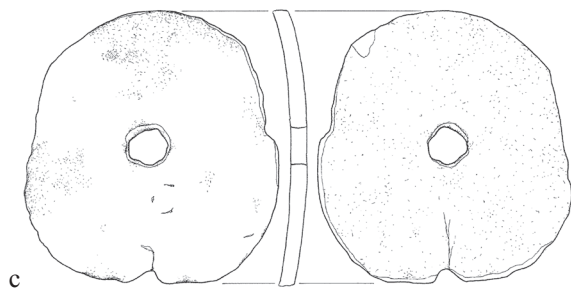
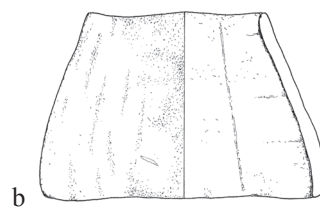
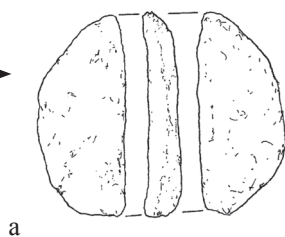
Plate 28



Scale 1:4

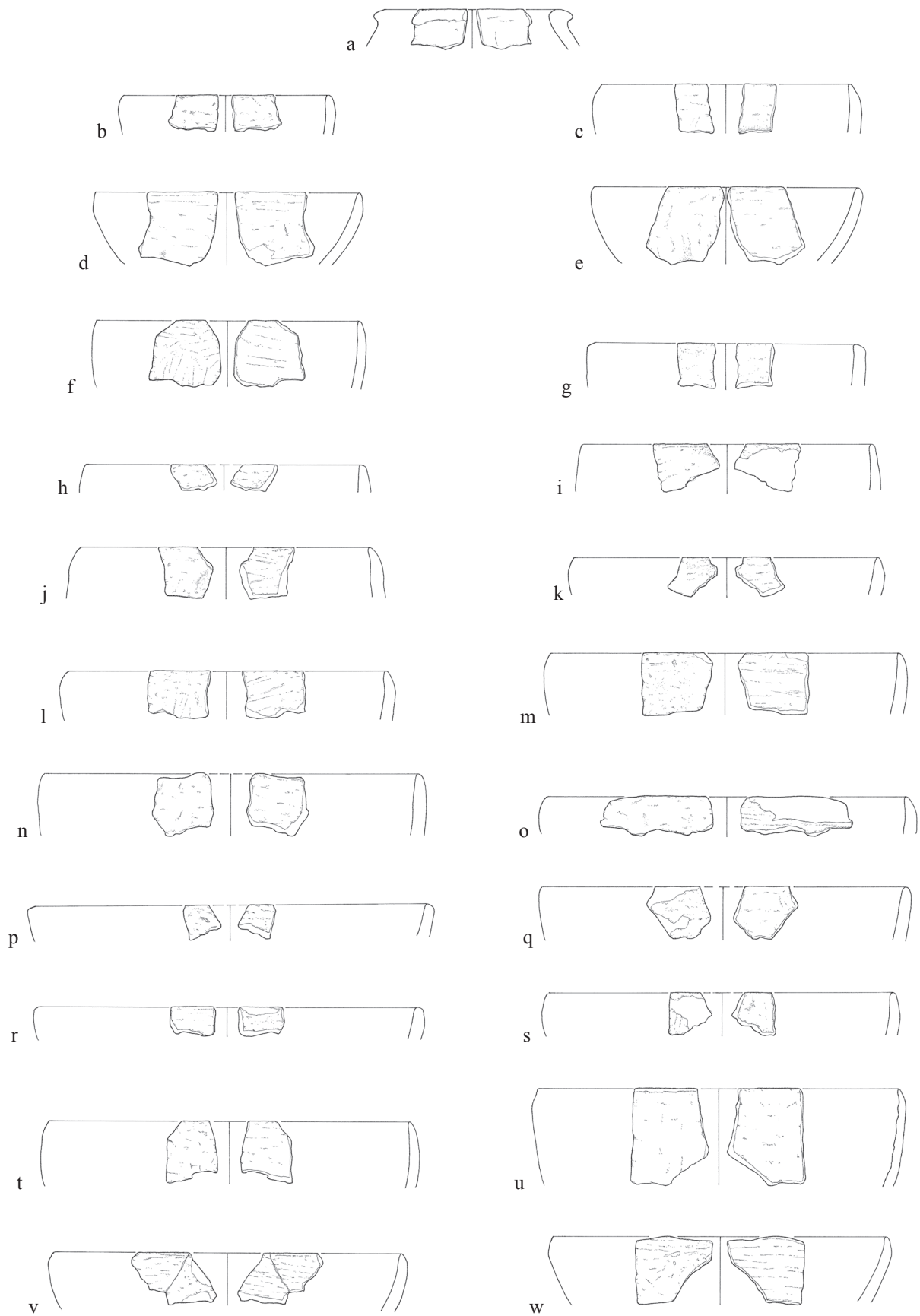
Plate 29

Scale 1:2 →



Scale 1:4

Plate 30



Scale 1:4

Plate 31

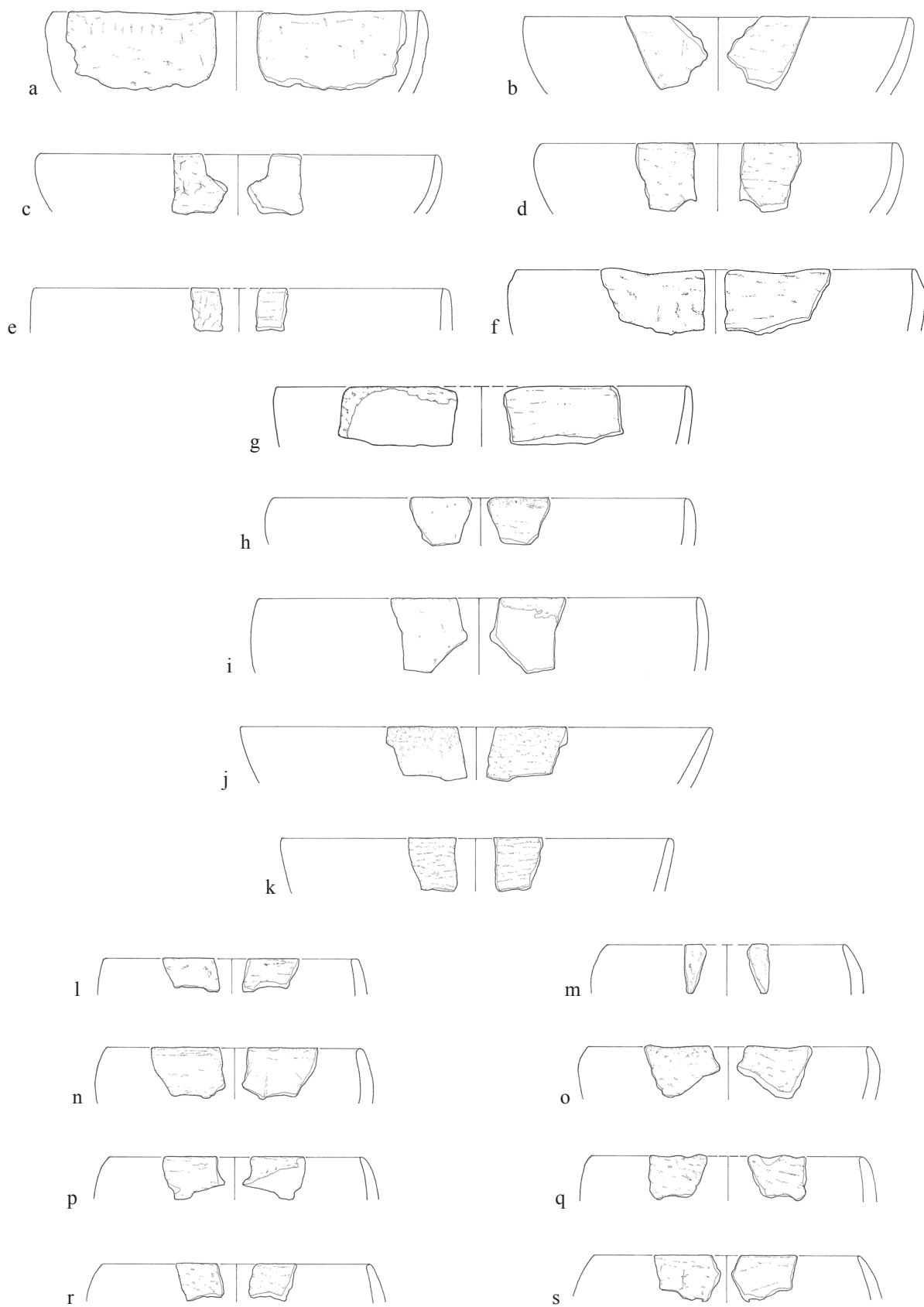


Plate 32

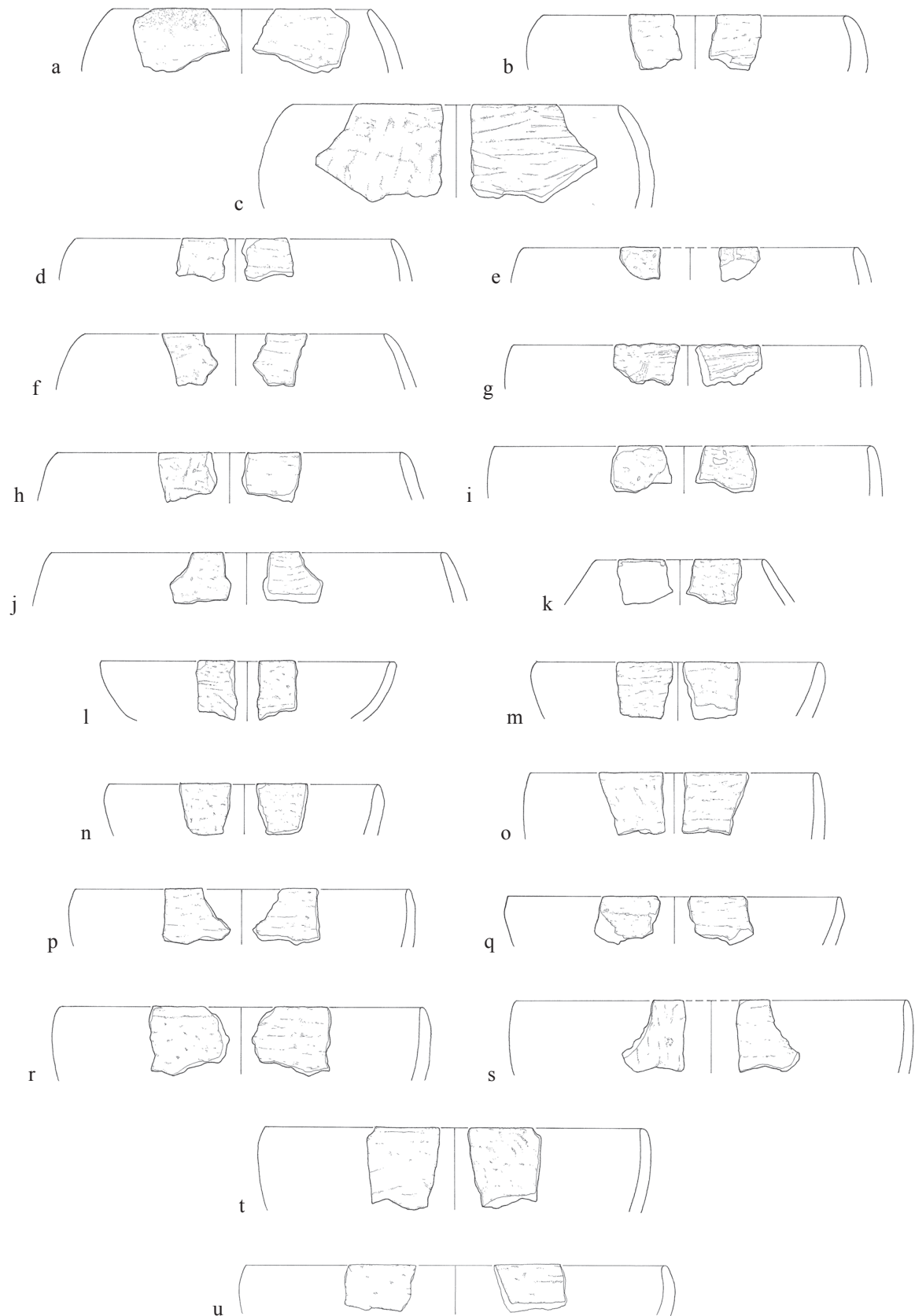


Plate 33

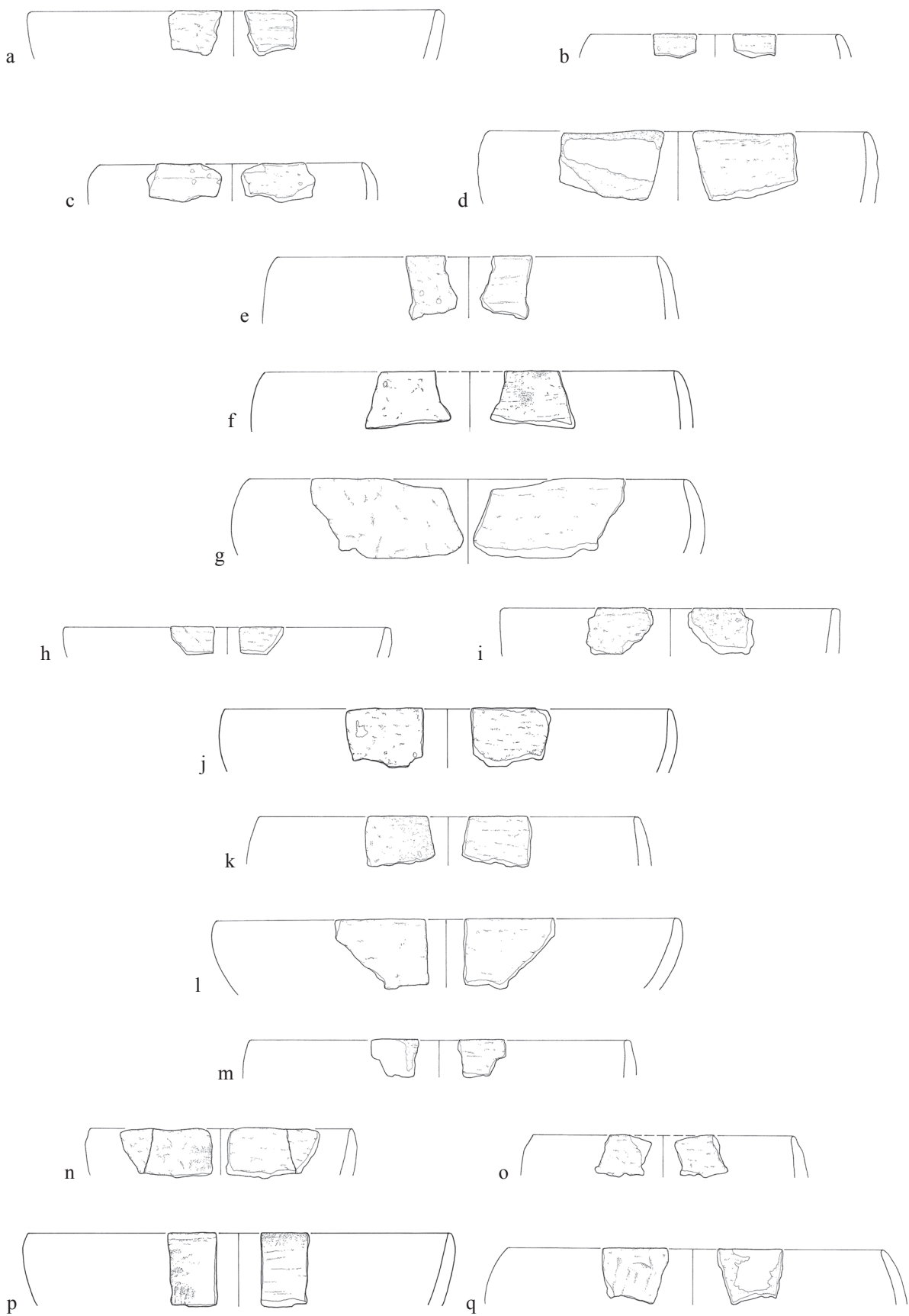


Plate 34

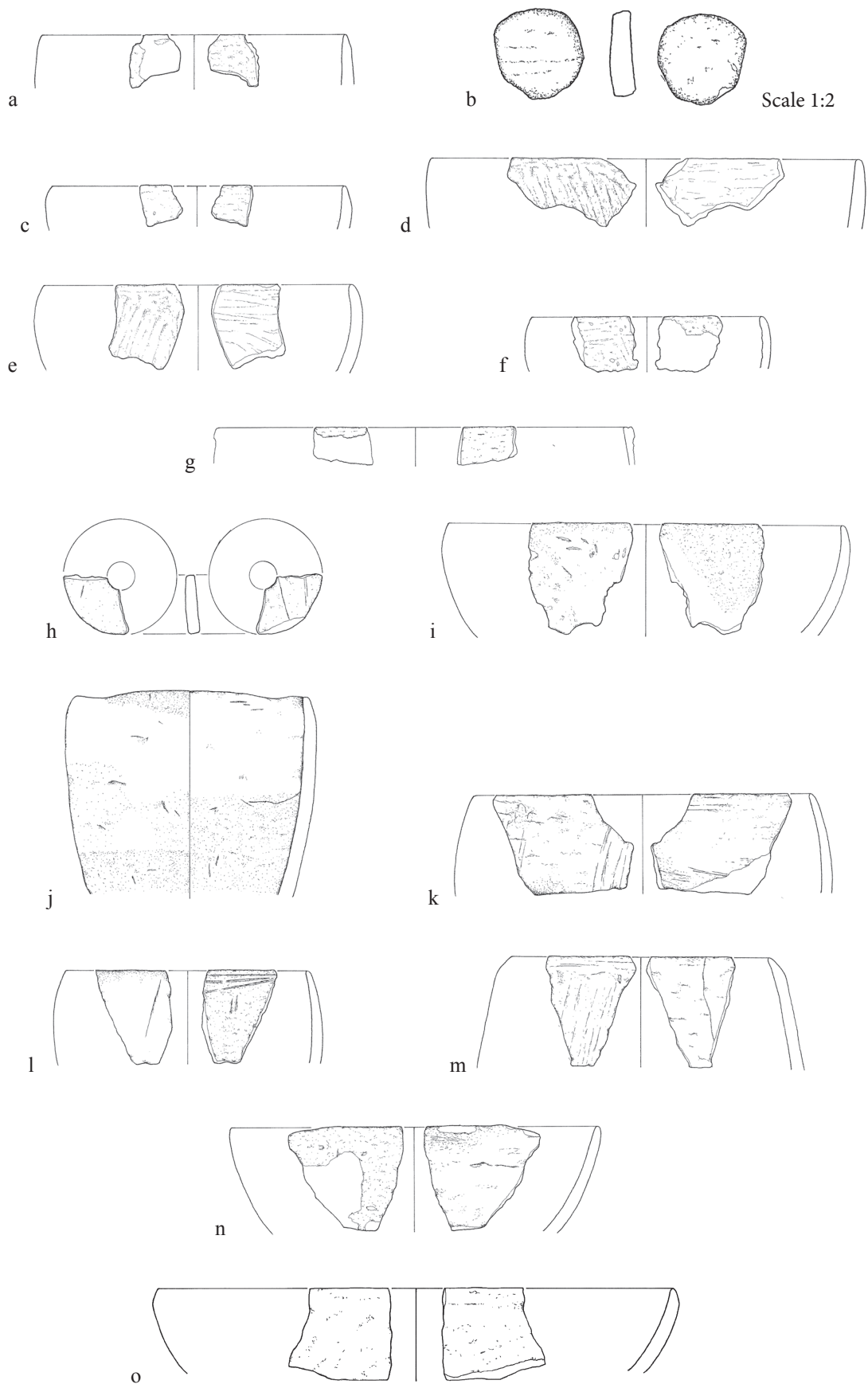


Plate 35

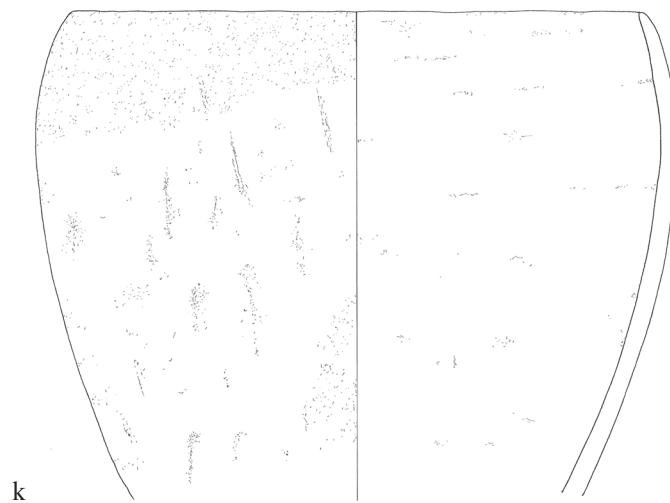
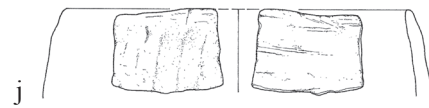
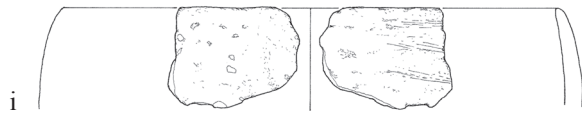
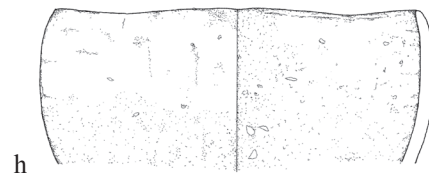
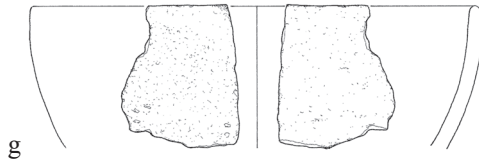
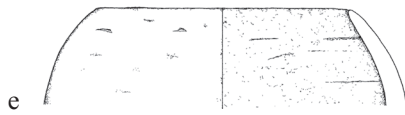
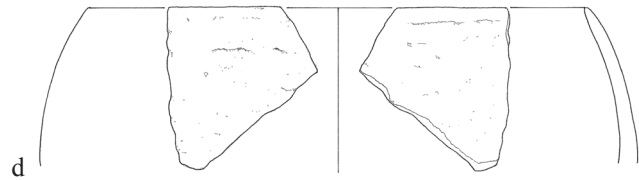
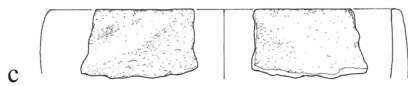
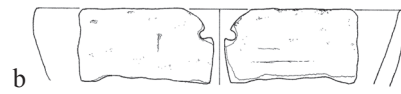
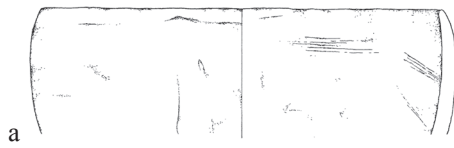


Plate 36

